Remedial Action Selection Report (RASR)

MW19/Hot Spot 1 Area

L.E. Carpenter & Company
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Borough of Wharton, Morris County, NJ

September 2007

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Introduction

1.1 Objective and Scope

On behalf of L.E. Carpenter & Company (LEC), RMT, Inc. (RMT) is presenting this Remedial Action Selection Report (RASR) to memorialize completion of additional remedial investigation (RI) of the MW19/Hot Spot 1 (MW19/HS1) Area of Environmental Concern (AOC), and the development of preliminary remedial actions to reduce or eliminate the potential risks associated with existing subsurface contamination.

This document presents new investigative information in a format specific to the Technical Requirements for Site Remediation N.J.A.C. 7:26E-4 [Remedial Investigations], and provides recommendations regarding potential remedial action in accordance with N.J.A.C 7:26E-5 [Remedial Action Selection]. Specifically, this RASR provides 1) a summary of site location and operational history, 2) a discussion of the MW19/HS1 AOC investigative and remedial history, 3) a discussion of August 2007 MW19/HS1 remedial investigation, 4) details regarding initial treatability [bench scale] evaluations, and 5) a description of the recommended remedial action

We have certified this report in accordance with requirements outlined in N.J.A.C 7:26E-1.5 (**Appendix A**).

1.2 Site Location

The LEC site (herein "the site") is located at 170 North Main St., Borough of Wharton, Morris County, New Jersey (**Figure 1**). The site comprises Block 301, Lot 1 and Block 703, Lot 30 on the tax map of the Borough of Wharton, and occupies 14.6 acres in a mixed-use industrial, commercial and residential area. The site is bordered to the south by the Rockaway River; by a vacant lot (Wharton Enterprises) to the east-southeast; and by a former compressed gas facility (Air Products) to the northeast. A residential area borders the site to the northwest (Ross Street) and the Washington Forge Pond borders the site to the west. A drainage ditch is located between the Air Products site and the LEC site. A pedestrian foot trail (rails-to-trails area), constructed along the former railroad right-of-way, bisects the site from north to south. During active LEC operations, the site consisted of several buildings and structures, some of which were partially demolished during the early 1990's as part of site decommissioning activities. Buildings 8, 9, 15, 16 and 17 located to the west of the rails-to-trails area remain. **Figure 2** is a map of the general site plan that depicts individual buildings present at the site, and other

pertinent site features specifically west of the rails-to-trails area. The MW19/HS1 AOC is located on the northwest side of the LEC site.

1.3 Site Operational History

As outlined below, historical site operations have been subdivided into two categories (1) mining and forging, and (2) vinyl manufacturing.

1.3.1 Mining and Forging Operations

Morris County and the Wharton area has been an iron mining district since the early 1700's. The earliest known use of the site was as an iron forge, termed the "Washington Forge." The Washington Forge was built in about 1795 and probably used iron ore from deposits in and around the Wharton area. Economically viable iron deposits were discovered at the site, subsequently site operations changed from forging to underground iron mining. According to a New Jersey Department of Labor publication (NJDOL, 1989), the Washington Forge Mine and West Mount Pleasant Mine are located "in the LEC lot." The NJDOL report states that the Washington Forge Mine opened in 1868 with the construction of two inclined shafts 20 feet apart on the grounds of the old forge.

The mine was worked until 1875 when it was closed because of the difficulty in handling groundwater seepage into the mine (Bayley, 1910). The mine reportedly opened again in 1879 after a drainage tunnel to the Orchard mine was completed. The Orchard mine was located south across the Rockaway River from the LEC site. The Washington Forge mine was permanently abandoned in 1881. The West Mt. Pleasant Mine connects with the Washington Forge Mine with an inclined access shaft located about 170 feet northeast of the southern-most Washington Forge mineshaft. The iron forge and mining history above shows that transportation of iron ores from various locations in Morris County onto the LEC property occurred over a period of at least 86 years (1795–1881). Much of the fill materials found on-site was derived from these iron mining operations.

1.3.2 Vinyl Manufacturing

The LEC facility was involved in the production of Victrix vinyl wall coverings from 1943 to 1987. The making of vinyl wall coverings involves several manufacturing processes that were carried out in the various buildings comprising the site. The first step in the process is referred to as lamination. Lamination involves the bonding of fabric to the vinyl film using a plastisol adhesive in conjunction with heat and pressure. The fabric/film laminate is then coated with a plastisol compound in order to texturize the material in preparation for printing. The printing process involves the application of

decorative print patterns and/or protective topcoat finishes. When printing is completed, the product is inspected and packaged for shipment to the consumer.

The manufacturing process involved the generation of liquid waste solvents including xylene and methyl ethyl ketone, waste pigments, and the generation of condensate from fume condensers. Additionally, airborne particulate matter was collected via a dust collector. Non-contact cooling water was discharged into the Rockaway River under a New Jersey Pollution Discharge Elimination System Permit. From 1963 until 1970 LEC disposed of its wastes, including a polyvinyl chloride (PVC) waste material into an unlined on-site impoundment. The facility was originally heated by coal, and later converted to #6 fuel oil.

Former vinyl manufacturing operations west of the rails-to-trails area including raw material storage, drum storage and printing occurred in Building 9 [adjacent to the MW19/HS1 AOC]. The lamination process was performed in Building 8 located directly to the east of Building 9 **[Ref. Figure 2**].

Active manufacturing of vinyl wall coverings ceased in 1987. Since that time the portion of the site east of the pedestrian trail (former railroad crossing) has been inactive except for remedial, investigative and monitoring related activities. Access is currently restricted to the area east of the pedestrian trail by a locked gate and an 8-foot high chain-link fence. Some of the buildings west of the pedestrian trail have been subleased as warehouse space, and for small manufacturing operations.

1.4 MW19/Hot Spot 1 AOC

The MW-19/Hot Spot 1 AOC is located immediately west of Building 9 in the northwest corner of the LEC site [**Ref. Figure 2**]. This AOC is associated with two former 10,000-gallon underground storage tanks (UST E-3 and UST E-4 and associated piping), which contained waste methyl ethyl ketone (MEK) and pigments and MEK respectively.

The approximate locations of the former USTs and associated piping are presented on **Figure 2**. In accordance with the 1986 Administrative Consent Order (ACO), GeoEngineering, Inc. (GEI) and Roy F. Weston (Weston) conducted a site wide Remedial Investigation (RI) in 1990 and separated the L.E. Carpenter site into three areas. The MW19/HS1 AOC was contained in the area classified as Area III. The historical Area III figure [Figure 8] contained within the 1990 RI that shows pertinent site features and sample locations specific to that portion of the site located east of the rails-to-trails [a railroad right of way in 1990], and more importantly the MW19/HS1 AOC is presented in **Appendix B**.

Four (4) test pits (TP-63 to TP-66) were excavated around the two USTs. Soil samples were collected from immediately above the water table (between 7 feet and 9 feet bgs) and analyzed for volatile organic compounds (VOCs), base neutral organics (BNO), and priority pollutant metals. No VOCs were detected above quantification limits and residual concentrations of cadmium were detected in TP-63. However, test pit sample results did identify elevated concentrations of bis (2-ethylhexyl) phthalate (DEHP). Subsequently, DEHP was identified as a primary MW19/HS1 area contaminant of concern (COC).

USTs E-3 and E-4 and visually impacted soil surrounding the USTs were removed from the site in 1991. A detailed account of site UST removal activities is presented in the *Final Technical Report for Tank Removal Operations* (Roy F. Weston, September 1991). In 1991, after tank removal activities had been completed, Weston installed groundwater monitoring well MW-19 in the area immediately adjacent to the excavation to determine whether groundwater had been impacted by previous operations conducted at the facility. The results of the groundwater sampling activities conducted at that time did not identify the presence of VOCs at concentrations above the method detection limits with the exception of 2-Butanone (MEK).

On November 30, 1994, Weston began the excavation of DEHP impacted soils in the MW19/HS1 AOC. Four (4) additional excavation events were conducted on December 6th, 12th 16th and 20th 2004 as a result of post excavation sampling results showing elevated concentrations of DEHP above site cleanup objectives at depth. The final size of the excavation was reportedly 70 feet long, ranged from 16 to 33 feet in width, and had an average depth of 9 feet below grade. The approximate location of this excavation is presented on **Figure 2**. Approximately 190 cubic yards of soil were removed from the excavation in 4Q04. Based on a review of historical data presented in the report entitled *Second Quarter Progress Report* (Roy F. Weston, Inc., August 1996), post excavation sample analytical results for DEHP from the excavation sidewalls ranged in concentration from 0.24 mg/kg to 140 mg/kg. Some of which were in exceedence of the DEHP impact to groundwater soil cleanup criteria outlined in the 1994 ROD of 100 mg/kg. Post excavation confirmatory soil samples for benzene, toluene, ethylbenzene, and xylenes (BTEX) were collected but did not show BTEX concentrations above site specific cleanup criteria. As a result no further excavation was performed in this area.

Documentation within the report entitled *Quarterly Progress Report* (Roy F. Weston, April 1995) outlining that the excavation was stopped within 5 ft of monitoring well MW-19 (presumably to avoid destruction of the well), within 6 ft of Building 9 to a total depth of 9 ft below ground level (bgl) to avoid potentially undermining the buildings foundation, suggests there is a possibility that contamination remains at depth which continues to act as the source of detected dissolved phase contamination in downgradient monitoring wells MW-19-5 and MW-19-7.

Quarterly groundwater sampling events conducted at MW-19 by Weston during first and second quarter 1995 identified the presence of benzene, toluene, ethylbenzene, and xylene (BTEX), in addition to MEK, at concentrations exceeding the NJDEP Groundwater Quality Standards (NJGWQS) stipulated in the ROD. In October 1996, Weston submitted a delineation plan to the NJDEP to further define the extent of VOC impact to groundwater and further delineate both VOC and DEHP impact to saturated and non-saturated soils in the MW19/HS1 AOC. Temporary monitoring wells were installed and sampled and soil samples were collected an analyzed. The results of chemical analyses performed on the groundwater samples collected from the temporary monitoring wells identified the presence of VOCs at concentrations similar to those identified in monitoring well MW-19 in 1995. Additionally, the soil samples collected at both borings B-3 and B-2A indicated DEHP concentrations of 790 mg/kg and 220 mg/kg respectively, exceeding the "Impact to Groundwater Soil Cleanup Objective" of 100 mg/kg outlined in the 1994 ROD.

RMT received approval of an additional MW19/HS1 area groundwater delineation plan in January 1998. Subsequently, in February 1998, RMT conducted a subsurface investigation that included the installation and sampling of an additional five (5) groundwater monitoring wells (MW19-1 through MW-19-5). VOC concentrations exceeding the NJGWQS were identified at MW19-1 (center of the plume); MW19-2; MW19 and at MW19-5. However, when compared to the VOC concentrations found during Weston's 1996 sampling (BW-1 through BW-9), significant reductions in the concentrations of VOCs were found at monitoring wells MW19 and MW19-2. As no remedial action had been performed (other as the 1994 soils excavation), it was concluded that natural attenuation of the volatile groundwater contaminants (toluene, ethylbenzene, xylene) was likely occurring. Groundwater samples were also analyzed for the presence of DEHP. DEHP concentrations exceeding NJGWQS were found at MW19-1 (center of the plume) and at MW19-5 (downgradient well).

The NJDEP letter dated July 15, 1998 required LEC to further delineate the downgradient extent of BTEX and DEHP impact to groundwater in the MW19/HS1 AOC and establish a clean zone for both parameters per the Technical Requirements for Site Remediation (N.J.A.C. 7:26E-4.4). RMT, on behalf of L.E. Carpenter, prepared an investigation workplan and submitted it to the NJDEP in November 1998. Per discussions and correspondence with the NJDEP (December 21, 1998), RMT was authorized to perform a groundwater screening investigation utilizing Hydropunch® or other similar methodology.

Off-site Hydropunch® sampling activities were performed on April 21, 1999. Significant difficulties advancing the Hydropunch® tool in the approved off-site locations were encountered due to the localized geology (large cobbles and boulders) seen at the LEC site. A total of twenty-four (24) advancement attempts were made, four (4) of which (HP-1 through

HP-4) penetrated the water table. Results of the Hydropunch® investigation are documented in the report entitled *MW-19/Hot Spot 1 Off-Site Subsurface Investigation* (RMT, June 1999). Analytical results obtained from groundwater samples collected from the four (4) Hydropunch® locations did not reveal concentrations of either BTEX or DEHP above site specific cleanup criteria. This suggested that no off-site migration of contaminants of concern was occurring.

The NJDEP, in their comment letter regarding the 3rd Quarter 2005 Monitoring Report dated December 27, 2005, voiced their concern over the high levels of toluene detected in MW-19-5. In their letter, the NJDEP claimed free product must be present and requested a vapor intrusion evaluation be performed on both the north and south sides of Ross St. in accordance with the new NJDEP Vapor Intrusion Guidance Document dated October 2005, and updated March 2006.

RMT responded to the December 27, 2005 letter in the 4th Quarter Groundwater Monitoring Report dated February 2006. In that response, RMT pointed out that, according to the NJDEP's Vapor Intrusion (VI) Guidance Document (October 2005), a VI evaluation must be completed if a receptor is within 30 feet of a BTEX plume (or within 100 feet if product is present). RMT continued on to say that the site currently has no free product issue as evidenced by the use of oil-water interface probes in the most contaminated monitoring wells within the MW19/HS1 AOC (*i.e.,* MW-19, MW-19-5, and MW-19-7) none of which have ever generated any measurable free product. The lack of free product is also evidenced by the fact that all individual BTEX concentrations are well below each parameters solubility limit. However, part of LEC Building 9 (**Figure 2**) lies within 30-feet of the area with residual soil and groundwater contamination, and therefore a soil vapor intrusion evaluation work plan was submitted in Section 4.4 of the 4th Quarter 2005 Quarterly Groundwater Monitoring Report.

The VI work plan was discussed with and approved by NJDEP during the conference call held on February 22, 2006. NJDEP formalized their approval to proceed with the scope of work outlined in the workplan in an email sent the same day. The soil gas investigation was performed on March 1 and 2, 2006. This investigation was documented in the report entitled *Soil Gas Investigation in the MW19/Hot Spot 1 Area L.E. Carpenter & Company Borough of Wharton* (RMT, May 2006).

Detectable soil gas constituents were collocated with the dissolved-phase concentrations in groundwater. Based on the groundwater hydraulics, and given Darcy's mathematical law governing groundwater flow, RMT concluded that groundwater with dissolved-phase concentrations of COC's cannot migrate directly north across Ross Street and therefore does not pose a risk to the Ross Street residences. The lack of risk from direct northward groundwater migration is also further substantiated by the lack of detectable COC's in both MW-19D and MW-19-8. However, as described in previous monitoring reports, the current groundwater

flow direction suggests that the leading edge of the dissolved COC's in groundwater may be migrating northeasterly towards an empty lot adjacent to a Ross Street residence, which is the reason RMT installed an additional well (MW-19-12) as proposed in the approved PRMP. MW-19-12 was installed in 2Q06 (June 2006), and has never exhibited any detectable concentrations of COCs. Based on these and historic data, RMT did no recommend active remediation be considered for this area as natural attenuation processes are very strong, and based on currently available data no risk of exposure exists.

NJDEP provided comments on the May 2006 Soil Gas Investigation in their Notice of Deficiency (NOD) letter dated June 20, 2007. The NJDEP was concerned that a residual source of BTEX contamination existed in the MW19/HS1 AOC due to the high dissolved phase concentrations remaining in groundwater 15 years after initial source removal actions occurred [*i.e.,* UST and piping removal and remedial excavation], and subsequently required LEC to prepare and submit a RASR within 30 days following receipt of the letter. RMT responded with a 45-Day extension request for RASR submittal in the letter dated July 17, 2007. The 45-Day RASR extension was approved by NJDEP as outlined in their emailed letter dated July 27, 2007.

This MW19/HS1 AOC preliminary RASR has been prepared to satisfy the requirements of the June 20, 2007 NJDEP NOD letter and document new remedial investigation subsurface data, while meeting the submittal deadline of September 4, 2007.

Section 2
MW19/HS1 AOC Evaluation and Subsurface Investigation

2.1 Building 9 Evaluation and Boring Placement

RMT conducted a remedial investigation between the dates of August 14 and 17, 2007. RMT advanced a total of nine (9) soil borings [SB-07-01 through SB-07-09] [**Ref. Figure 2**] to further evaluate and define the nature and extent of potential residual contamination acting as a continuing source of shallow groundwater impact.

2.1.1 Building 9 Infrastructure and Interior Boring Locations

Three (3) of the borings [SB-07-01, 02 and 03] were installed within the western interior of Building 9, into the sub slab vadose and saturated zones. These three borings were located with a bias towards the presence of former Building 9 process infrastructure relating to USTs E-3 and 3-4. Specifically, two trench drains [Drain #1 and Drain #2] and associated connection piping were identified in the northwestern corner of Building 9 adjacent to the concrete loading dock [Ref. **Figure 2**]. Drain #1 is located close to the western wall of Building 9 and formally connected the drain system to the two exterior USTs. Drain #1 connection piping to the USTs was removed and the Drain #1 discharge hole sealed with concrete grout during tank removal operations in 1990/1991. Evidence of a 2 feet wide concrete filled trench [assumed to formally house piping connecting Drains #1 and #2] was also discovered during Building 9 evaluations. This concrete filled trench extended approximately 40-feet east from Drain #1 and connected to Drain #2 [**Ref. Figure 2**].

2.1.2 Exterior Boring Locations

The remaining six (6) boring locations [SB-07-04 through SB-07-09] were installed on the western exterior of Building 9 as shown on **Figure 2**. Borings SB-07-04 and 06 were installed between the soils remaining east of the former 1994 UST soil excavation [**Ref. Figure 2**] and the Building 9 footer. These two boring locations were also biased towards former piping runs connecting Drain #1 to USTs E-3 and E-4. Boring SB-07-08 was also installed between the soils remaining east of the former 1994 UST soil excavation and the Building 9 footer but further south [upgradient] into an area that would define a lateral clean zone based on field screening. Boring SB-07-05, 07, and

09 were installed in areas specific to the 1994 UST soil excavation lateral extents and downgradient monitoring well MW-19-5 monitoring well [Boring 09], within the former UST excavation footprint [Boring SB-07-07], and at the leading edge of the soils remaining east of the former 1994 UST soil excavation and the Building 9 loading dock [downgradient] from the trench drain system located with Building 9.

2.1.3 Installation Methods and Field Screening

All boring installations were performed by Warren George, Inc. located in Jersey City, NJ under the direction of an RMT field scientist. All six (6) exterior borings were installed using a standard Hollow Stem Auger (HSA) drill rig, and all three (3) interior borings were installed using a small electric HSA drill rig capable of entering Building 9 and navigating the interior from both a lateral and vertical standpoint.

Continuous split spoon soil samples were collected every 2-feet and logged in accordance with the Unified Soil Classification System (USCS). Borings logs for all nine (9) locations are presented as **Appendix C**. In addition the head space from each sample interval was screened with a Photoionization Detector (PID) for total organic compound concentration in parts per million (ppm). Soil samples were collected form the vadose zone if the PID suggested high concentrations, and/or from the saturated zone.

2.2 Geology and Soil Sample Results

The results of laboratory testing of 9 soil samples are summarized on **Table 1, Figure 2, Figure 3, and Appendix D**.

RMT compared the soil testing results with the New Jersey Soil Cleanup Criteria. Out of the nine samples, only two had any detectable constituents above the applicable direct contact soil cleanup criteria. Borings SB-07-04 and SB-07-09 had DEHP levels above the direct contact criterion for DEHP. Both of these samples were collected within the saturated zone just below the water table (10 to 14 feet below the ground surface). Note that DEHP is not detectable in groundwater from any of the wells in the MW-19 area, indicating that the DEHP is strongly adsorbed onto soil particles and is not mobile within the saturated zone. Both the DEHP and xylene detected in these two samples plus the soil sample SB-07-01 (also from the saturated zone near the top of the water table) contained both xylene and DEHP above the impact to groundwater cleanup criteria (IGWSCC).

Figure 2 shows that the approximate maximum and minimum aerial distribution of residual contamination based on an analysis of existing groundwater contaminant distribution and groundwater flow direction (see inset at upper right of **Figure 2**), and the soil laboratory data and observed site features (see data summary boxes for total VOC's and SVOC's and the former

UST's, connecting lines and interior floor drains depicted on the inset on the lower right corner of **Figure 2**). The data show that residual sources exist associated with both the former tanks and fill lines, but also under the building floor apparently related to the existing floor drain (this floor drain appears to have been grouted in place based on field observations.

The soil data were used, together with qualitative field observations and HnU readings (photoionization detector or PID) and location of the floor drains and connecting UST pipes, to outline the approximate vertical distribution of residual contamination (see red hachure's on **Figure 3**). It appears that residual contamination in the vadose zone is limited to the areas of initial release along the piping runs and floor drains. A smear zone at the top of the water table apparently is an ongoing "secondary" source that continues to provide contaminant mass to the aquifer, especially during water table fluctuation events.

The stratigraphy of the area can be visualized by examining the cross sections shown on **Figure 3**. As can be seen on cross section A-A', there are significant silt and clay-rich soils in the vadose zone and upper saturated zone under Building 9. Most of the area outside of the building and 2-5 feet below the water table consists predominantly of fine to medium grained sand and sand-gravel mixtures. The preponderance of more permeable sand/gravel mixtures several feet below the water table is consistent with the geologic information for the main remediation area on the east side of the recreational trail.

2.3 Aquifer Slug Tests and Hydrogeology

To determine the hydraulic parameters of the unconsolidated aquifer, slug tests were conducted on August 8, 2007 at various MW19/HS 1 ACO monitoring wells. These tests were conducted to calculate a range of hydraulic conductivity values for the contaminant plume area to be used in the determination of potentially viable remedial options for the shallow aquifer underlying the MW19/HS1 AOC.

Pressure transducers were placed in monitoring wells MW-19, MW-19-5, MW-19-6, MW-19-7, and MW-19-11 to monitor water displacement and recovery during the addition or removal of a slug to the wells. MW-19 is a 4-inch diameter well and the other wells are 2-inch diameter wells, all with screens set spanning the water table or placed a few feet below it. Prior to testing, the static water level within each monitor well was manually measured using a handheld water level indicator and recorded for the reference to the test water displacements. Water levels were electronically monitored using *in situ* MiniTROLL® programmable pressure transducer/data loggers. The pressure transducer had pressure ratings of 30 pounds per square inch (psi).

The MiniTROLL® data logger (data logger) was used to record pre-test conditions displacement values and recovery data in one to three-second time intervals. A 5-foot long, 1 5/8-inch outside diameter slug was rapidly placed into the well and submerged beneath the water table (dropped in) while the data logger recorded the water displacement (measured by pressure changes) until stable, essentially when the data indicated the displacement was near zero. The logger was reset and a second test conducted by rapidly pulling the slug out of the well while the data logger recorded the water displacement (measured by pressure changes) when the data indicated the water displacement was near zero. The data loggers were connected to a laptop computer to facilitate viewing of real-time drawdown data and comparison of water level information.

The data was downloaded from the MiniTROLL® to a laptop computer and graphed with the Microsoft Excel program. Displacement, temperature and time are graphed for visual verification of data quality. In some instances the original tests were re-run such as for MW-19-5 based on this first approach. Once the text data was determined to be representative of the aquifer in the vicinity of the well screen (the upper portions of the unconsolidated aquifer), the equipment was removed from the well and the next test conducted in a different well.

Once all tests were verified, the analytical solution was selected in AQTESOLV® to evaluate the test data. The test analyses reports are provided for reference in **Appendix E**. The method of evaluation was taken from the Bouwer-Rice (1976) solution for an unconfined aquifer. [Reference: Bouwer, H. and R.C. Rice, 1976. *A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells*, Water Resources Research, vol. 12, no. 3, pp. 423-428.] The solution assumes the aquifer has infinite aerial extent, is homogeneous and uniform in thickness, is unconfined and flow is in a steady state.

Parameters necessary for the AQTESOLV® program included the construction dimensions of well casings and screens, static water levels, pre-test water levels, post-test recovery water level data, screen packing porosity and dimensions, and aquifer anisotropy. The aquifer thickness was assumed to be 20 feet for all locations tested (approximate depth of each well). Hydraulic conductivity (K) is the rate of flow of water through a cross section of one square foot of under a unit hydraulic gradient at the prevailing temperature. The K values will be useful in selection and final design of the remedial options. Results of the slug drop-in tests are tabulated in **Table 2** and those for the slug pull-out tests are tabulated in **Table 3**.

The slug test method of determining aquifer hydraulic conductivity (K) is not utilized for precision. It is useful to determine the K value in the immediate vicinity of the screened section of a well which is generally set within a target area, usually within the plume or area of concern where remedial action is likely. The data indicates the hydraulic conductivity of the formation in the vicinity of the MW-19-7 well screen is significantly higher than hydraulic conductivities

calculated for the other wells. Based on the geologic logs and cross section, MW-19-7 is predominantly screened through a relatively permeable sand and gravel unit, which likely explains the higher hydraulic conductivity. This interpretation is consistent with the value of 1.54 cm/sec from the slug test, which falls in the range of clean sand to gravel published in the literature (Freeze and Cherry, 1979). The range of hydraulic conductivity in the other wells tested ranges from 2.4×10^{-3} to 2.8×10^{-4}. These values are consistent with the types of soils delineated on the cross sections (**Figure 3**) and fall in the published range of hydraulic conductivities for silt to silty sand. This suggests that the area proposed for treatment may be more amenable to a mechanical mixing method for delivering chemical oxidants as a treatment alternative. However, the data do not preclude the use of injection wells for delivery of chemical oxidants, should that method be chosen as the final engineering design of choice for this area.

Section 3
Remedial Evaluation and Approach

The following sections outline initial remedial evaluations completed following receipt of MW19/HS1 AOC August 2007 RI data, and viable remedial approach developed following review of this data in conjunction with existing site information and knowledge.

3.1 *In Situ* Chemical Oxidation (ISCO)

In situ chemical oxidation (ISCO) has become a popular method for remediating organics in soil and groundwater. However, proper ISCO design for successful field implementation requires a comprehensive knowledge of contaminant levels, the subsurface environment, and oxidant sinks. RMT's field evaluations during the installation of various groundwater monitoring wells and borings has provided a reasonably clear understanding of the subsurface setting. However; questions relating to Total Oxidant Demand (TOD) and the overall treatability of DEHP were not known. Subsequently, RMT submitted interior and exterior soil samples from the impacted saturated zones of borings SB-07-01 [11'-13'] and SB-07-06 [9'-11'] to Redox Tech (RT) for TOD analyses. RMT also requested that RT determine the overall treatability of DEHP using the chemical oxidant of choice [catalyzed sodium persulfate]. For all analyses, RT used a base [sodium hydroxide] catalyzed sodium persulfate. The soil samples were received and prepared by RT on August 21, 2007, and titrated on August 27, 2007. The DEHP sample was received and prepared by RT on August 27, 2007.

3.1.1 TOD Testing and Analyses

TOD testing involves mixing various measured amounts of a standard oxidant (in this case persulfate) with subsamples of impacted soil, allowing them to equilibrate, and then measuring the residual persulfate to determine the amount consumed. As in all cases, it is not only the target analyte(s) that exerts oxidant demand, but all other naturally-occurring and anthropogenic inorganic and organic reduced chemical species. Therefore, to ensure that the target analyte is oxidized, the bench-scale testing is intended to measure the total amount of oxidant demand exerted during full-scale treatment.

TOD tests determine the approximate mass of chemical required to treat a specific soil volume. RT employed a simple colorimetric technique to estimate the TOD. TOD results are reported in grams of oxidant per kilogram of saturated sediment material. The following results were reported for the prepared LEC samples.

- SB-07-01 [11'-13'] 4.7 g/kg
- SB-07-06 [9'-11'] 2.7 g/kg

The LEC TOD results and a paper entitled *Estimating the Total Oxidant Demand for in-Situ Chemical Oxidation Design* (Haselow et. al., 2003) is presented in **Appendix F**.

3.1.2 DEHP Treatability

Because the other petroleum hydrocarbon contaminants (e.g., toluene and xylene) are at high concentrations in soils from the site, determining the effectiveness of chemical oxidation on DEHP is more easily accomplished using spiked aqueous samples. Subsequently, RT prepared water with DEHP at aqueous solubility (literature values vary between approximately 40 and 290 ug/L) by equilibrating neat DEHP with DI water for three days at ambient temperatures (approximately 25° C).

The water with DEHP was then split into 4 samples. Two samples were treated with base catalyzed sodium persulfate solution for 7 days and two samples were used as controls (untreated). The base catalyzed persulfate was added at a concentration of approximately 10 g/L for the two treated samples. All four samples will be sent to an external laboratory for analysis at the end of the 7 day treatment period. The laboratory analyses will indicate if sodium persulfate treatment reduced the concentration of DEHP in the ground water samples by comparing treated and untreated samples. The laboratory will analyze the samples using EPA method 8270. DEHP treatability results will be forwarded upon receipt.

3.2 Remedial Approach

Based on historic and recent MW19/HS 1 AOC RI data, and the preliminary ISCO evaluations, a combination of vadose zone excavation, mechanical blending of chemical oxidant and catalyst into the capillary fringe and saturated zone, installation of a permeable media layer at depth, backfilling, restoration, and potential installation of injection wells within the permeable media layer to facilitate groundwater polishing utilizing ISCO is likely a viable remedial approach for this AOC.

3.2.1 Vadose Zone Excavation

Following further RI and subsequent lateral definition of the MW19/HS 1 AOC [specifically underneath Building 9], a vadose zone soil excavation plan will be designed that takes into account existing site features such as buildings and infrastructure, soil staging areas, post excavation side wall sampling, and soil characterization and

management. It is anticipated that all excavated vadose zone soil will be managed off-site as a non-hazardous solid waste.

3.2.2 Chemical Oxidant Mechanical Blending

The chemical oxidant delivery technique is often the most difficult aspect of successfully implementing in situ chemical oxidation or reduction. Although a chemical alternative may be proven to be effective at remediating a contaminant of concern, it is the effective distribution of these chemicals through the subsurface that will dictate whether remediation is successful or not. *In situ* soil blending will be performed following vadose zone excavation.

The *in situ* soil blending technique proposed for this AOC involves using an *in situ* blender to effectively distribute chemical amendments throughout the soil medium to treat contaminants of concern. The *in situ* blender is capable of mixing dry soil as well as sludge material to depths of 16 feet below ground surface. Utilizing hydraulic pressures of 5,000 psi, a 28-inch diameter mixing drum is rotated at speeds up to 100 rpm with torque forces of 20,300 foot-pounds. This rugged durability allows the mixing drum to penetrate all soil types, even with the presence of backfill materials such as bricks, boulders, and rebar.

Since many chemical remediation alternatives require direct contact with the target contaminants, the effectiveness of the remediation strategy is often limited by the ability to distribute the chemical amendments throughout the soil medium. The *in situ* blender is the most effective and efficient method to achieve this at shallow depths (<16 feet), and the production rate of this equipment is comparable to excavating.

Application of chemicals will be performed within each cell systematically across the vadose zone excavation. The predetermined loading rate of amendment (e.g., chemical oxidant) will be placed into the excavated area using the excavator. The loading rate will be determined based on the concentrations of the contaminants within that area. The *in situ* mixer will then be used to mix the chemicals with the soil down to the target depth. Once complete, the crew will move to the next cell and the process will be repeated.

The *in situ* blending process will be performed by systematically subdividing the vadose zone excavation area into segments. The segments dimensions and chemical loading requirements will be determined based on the target area and each segment will be mixed with the designated mass of chemical. Chemical will be shipped to the site in 2000 lb super sack containers.

3.2.3 Permeable Media Layer and Restoration

To facilitate AOC groundwater polishing using ISCO, a permeable layer of aggregate material [e.g., pea gravel] will be placed in the excavation directly above the mechanically blended saturated zone and covered with a geotextile membrane. The excavation will be backfilled with general fill material, compacted, and restored to existing grade and conditions.

3.2.4 Chemical Oxidant Injection

Based on the results of groundwater monitoring following completion of the previous remedial steps, groundwater polishing using ISCO maybe required. The most common method of chemical injection is through Geoprobe® rods. ISCO solutions or slurries can be injected directly through Geoprobe® rods at discrete depths to more uniformly distribute the chemical amendments, increasing the degree of contact with the target contaminants and maximizing the effectiveness of treatment. Through the use of proprietary injection tools and methods, and installation of the permeable media layer, maximum distribution of the ISCO will be achieved.

In addition to injecting through Geoprobe® rods, ISCO injection through injection wells designed to address the remaining target treatment volume can be performed. Well materials are selected based on the type of chemical amendment and application requirements.

Specially designed injection trailers are used to mix chemicals and pump through the access point (e.g., Geoprobe® rod or injection well). The tanks, piping, and pumps are carefully selected for chemical compatibility and field durability. Mobile scheduled ISCO injection events using a permanent well network can also be employed.

Section 4
Conclusions and Recommendations

The following bullets outline the conclusions and recommendations reached following evaluations of the new data received from both the August 2007 MW19/HS 1 AOC RI and the ISCO evaluations [TOD and Treatability] in conjunction with existing site data.

4.1 Conclusions

- A residual source of groundwater contamination exists on the western side of Building 9 between the former UST excavation and the Building 9 footer, and along the northern perimeter of the former UST excavation. In addition, this residual source extends at least 40-feet east underneath the Building 9 footer and floor slab to Drain #2.
- Initial bench scale ISCO evaluations suggest that existing organic contamination in the residual source area and shallow groundwater can be remediated to below applicable NJ soil and groundwater standards through the use of base catalyzed sodium persulfate.
- The detailed nature and extent of residual source material under the Building 9 floor slab, especially east of Drain #2, and south of boring SB-07-02 is not known.
- MW19/HS 1 ACO residual source and groundwater remediation will most likely involve a combination of vadose zone excavation, mechanical blending of chemical oxidant and catalyst into the capillary fringe and saturated zone, installation of a permeable media layer at depth, backfilling, restoration, and potential installation of injection wells inside Building 9. Future installation of additional injection wells would be facilitated by installing within the permeable media layer to facilitate groundwater polishing utilizing ISCO.

4.2 Recommendations

- Complete a more comprehensive remedial investigation (RI) of the Building 9 interior and exterior subsurface soils and groundwater in accordance with N.J.A.C 7:26E Subchapter 4 to determine the true nature and extent of the residual source area and groundwater contamination.
- Further evaluate vapor intrusion related issues associated with Building 9 sub slab materials following the RI in accordance with the *NJDEP Vapor Intrusion Guidance* (October 2005).
- Finalize the DEHP treatability and ISCO delivery evaluations.
- In accordance with N.J.A.C 7:26E-5.2(d), document the results of all final RI activities along with a detailed description of the proposed remedial action, schedule, and potential plan for monitoring in a Remedial Action Workplan (RAW) prepared to meet the requirements outlined in N.J.A.C 7:26E-6.2.

Tables

TABLE 1
L.E. Carpenter and Company - Wharton NJ
MW19/Hot Spot 1 Remedial Action Selection Report (RASR) Soil Sampling Results [mg/kg]

CONSTITUENTS	BORING ID & LAB SAMPLE NUMBER								
	SB-07-01	SB-07-01	SB-07-03	SB-07-04	SB-07-04	SB-07-06	SB-07-06	SB-07-08	SB-07-09
	17-Aug-07	17-Aug-07	17-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07
	Lab Sample # 0708383-07 Sample Depth 4.5-6.5'	Lab Sample # 0708383-08 Sample Depth 11-13'	Lab Sample # 0708383-09 Sample Depth 9-11'	Lab Sample # 0708383-01 Sample Depth 2-6.5'	Lab Sample # 0708383-02 Sample Depth 10-12'	Lab Sample # 0708383-03 Sample Depth 12-14'	Lab Sample # 0708383-04 Sample Depth 14-16'	Lab Sample # 0708383-06 Sample Depth 12-14'	Lab Sample # 0708383-05 Sample Depth 12-14'
ORGANICS [SW846 8260 – VOLATILES] mg/kg									
Ethylbenzene	**3.4**	**26**	**0.66**	**0.64**	**23**	**2.5**	**0.56**	< 0.057	**15**
Heptane	< 2.8	< 14	< 0.66	< 0.58	< 11	**0.7**	< 0.28	< 0.29	**3.7**
Isopropylbenzene	< 0.56	< 2.9	< 0.13	< 0.12	< 2.2	< 0.12	< 0.056	< 0.057	**0.97**
Methylcyclohexane	< 2.8	< 14	< 0.66	< 0.58	< 11	**1**	< 0.28	< 0.29	**4.8**
n-Propylbenzene	< 0.56	< 2.9	< 0.13	< 0.12	< 2.2	**0.16**	< 0.056	< 0.057	**1.7**
Tetrachloroethene	**0.82**	< 2.9	**0.3**	< 0.12	< 2.2	< 0.12	< 0.056	< 0.057	< 0.6
Tetrahydrofuran	< 2.8	< 14	< 0.66	< 0.58	< 11	**0.7**	< 0.28	< 0.29	**3.8**
Toluene	**89**	**450**	**26**	**14**	**300**	**15**	**5.6**	**0.48**	**59**
Trichloroethene	**0.96**	< 2.9	**0.23**	< 0.12	< 2.2	< 0.12	< 0.056	< 0.057	< 0.6
1,2,4-Trimethylbenzene	< 0.56	**14**	< 0.13	< 0.12	**4.7**	**0.69**	**0.13**	< 0.057	**7.2**
1,3,5-Trimethybenzene	< 0.56	**4.1**	< 0.13	< 0.12	< 2.2	**0.24**	< 0.056	< 0.057	**2.3**
Xylene (Total)	**17**	**120**	**2.8**	**3.4**	**120**	**13**	**2.8**	< 0.17	**74**
ORGANICS [SW846 8270C – SEMIVOLATILES] mg/kg									
Acenaphthene	< 0.038	< 3.8	**0.094**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Acetophenone	< 0.038	< 3.8	< 0.088	**0.16**	< 19	< 0.4	< 0.37	< 0.019	< 20
Anthracene	< 0.038	< 3.8	**0.22**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Benzo(a)anthracene	**0.039**	< 3.8	**0.41**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Benzo(a)pyrene	< 0.038	< 3.8	**0.35**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Benzo(b)fluoranthene	**0.046**	< 3.8	**0.39**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Benzo(k)fluoranthene	< 0.038	< 3.8	**0.2**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Benzo(g,h,i)perylene	< 0.075	< 7.6	**0.19**	< 0.077	< 37	< 0.79	< 0.074	< 0.038	< 40
Benzyl Alcohol	< 0.038	< 3.8	**0.054**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Butyl Benzyl Phthalate	< 0.038	**8.4**	< 0.088	**0.088**	< 37	**0.88**	**0.099**	< 0.019	< 20
Carbazole	< 0.038	< 3.8	**0.062**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Chrysene	< 0.038	< 3.8	**0.41**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Bis(2-ethylhexyl) Phthalate [DEHP]	**1.8**	**190**	< 0.088	**1.8**	**400**	**14**	**1.7**	**0.45**	**390**
Fluornthene	**0.048**	< 3.8	**0.87**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Fluorene	< 0.038	< 3.8	**0.09**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20
Indeno(1,2,3-cd)pyrene	< 0.075	< 7.6	**0.14**	< 0.077	< 37	< 0.79	< 0.074	< 0.038	< 40
4-Methylphenol	< 0.038	< 3.8	< 0.088	**0.12**	< 19	**0.73**	**0.53**	**0.42**	< 20
2-Methylphenol	< 0.038	< 3.8	< 0.088	**0.44**	< 19	**0.54**	**0.25**	**0.19**	< 20
Naphthalene	**0.24**	**17**	**0.094**	**0.17**	< 19	< 0.4	< 0.37	< 0.019	< 20
Phenanthrene	< 0.038	< 3.8	**0.97**	< 0.39	< 19	< 0.4	< 0.37	< 0.019	< 20

TABLE 1
L.E. Carpenter and Company - Wharton NJ
MW19/Hot Spot 1 Remedial Action Selection Report (RASR) Soil Sampling Results [mg/kg]

CONSTITUENTS	BORING ID & LAB SAMPLE NUMBER								
	SB-07-01	SB-07-01	SB-07-03	SB-07-04	SB-07-04	SB-07-06	SB-07-06	SB-07-08	SB-07-09
	17-Aug-07	17-Aug-07	17-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07	16-Aug-07
	Lab Sample # 0708383-07 Sample Depth	Lab Sample # 0708383-08 Sample Depth	Lab Sample # 0708383-09 Sample Depth	Lab Sample # 0708383-01 Sample Depth	Lab Sample # 0708383-02 Sample Depth	Lab Sample # 0708383-03 Sample Depth	Lab Sample # 0708383-04 Sample Depth	Lab Sample # 0708383-06 Sample Depth	Lab Sample # 0708383-05 Sample Depth
RCRA Metals [EPA 6000/7000] mg/kg									
Arsenic	**15**	**9.3**	**19**	**5.3**	**2.9**	**2.8**	**3.9**	**4.4**	**2.1**
Barium	**190**	**110**	**240**	**140**	**24**	**36**	**36**	**59**	**27**
Cadmium	**0.64**	**4.7**	**0.7**	**1.9**	**4.7**	**0.2**	**0.075**	**0.11**	**0.39**
Chromium	**13**	**19**	**19**	**32**	**8.4**	**11**	**12**	**12**	**9.5**
Lead	**100**	**12**	**110**	**24**	**4.7**	**5.9**	**5.2**	**6.7**	**3.7**
Mercury	**0.45**	< 0.05	**0.25**	**0.063**	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Selenium	**1.4**	**0.59**	**1.2**	**0.89**	**0.48**	**0.33**	**0.5**	**0.29**	**0.27**
Silver	**0.14**	< 0.1	**0.17**	**0.13**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Notes

1) < Less than - A qualifier designating a Non-Detect with a value less than the Method Detection Limit (MDL) shown.
2) Concentrations shown in bold are exceed the applicable MDL

120	Concentration exceeds the IGWSCC
400	Concentration exceeds the IGWSCC & NRDCSCC

Legend

mg/kg: Micrograms per kilogram (ppm)
SB: Soil Boring
IGWSCC: Impact to groundwater soil cleanup criteria
NRDCSCC: Non residential direct contact soil cleanup criteria

	IGWSCC mg/kg	NRDCSCC mg/kg
Xylene (Total)	67	1000
DEHP	100	210

TABLE 2
L.E. Carpenter and Company - Wharton NJ
MW19/Hot Spot 1 RASR Drop-In Slug Test Results

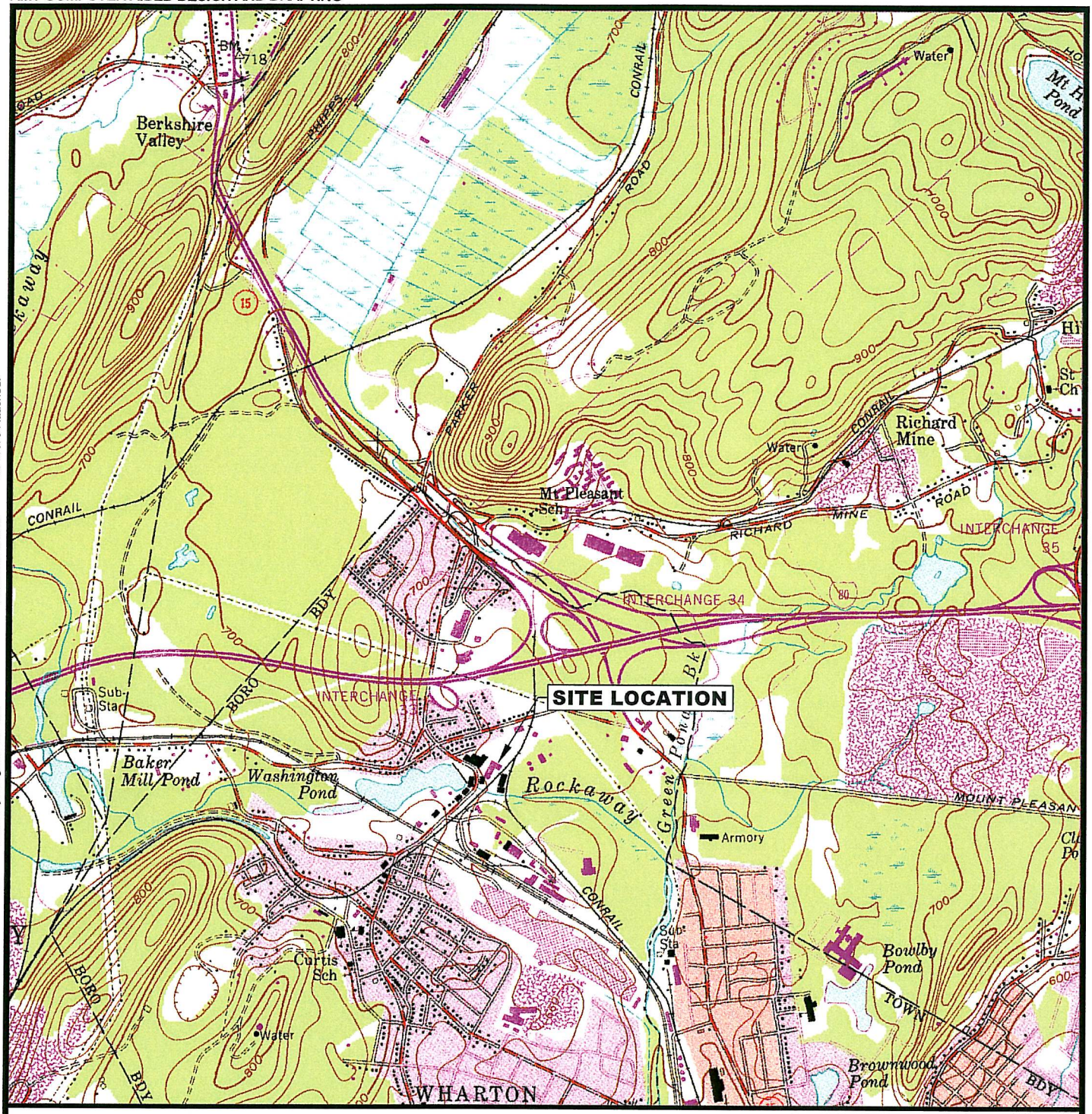
MONITOR WELL	HYDRAULIC CONDUCTIVITY (CM/SEC)	$Y_{(0)}$ (FT)
MW-19	0.0005042	0.0855
MW-19-5	0.0002853	0.1926
MW-19-6	0.001442	0.1954
MW-19-7	1.524	1
MW-19-11	0.0005476	0.1342

TABLE 3
L.E. Carpenter and Company - Wharton NJ
MW19/Hot Spot 1 RASR Pull Out Slug Test Results

MONITOR WELL	HYDRAULIC CONDUCTIVITY (CM/SEC)	$Y_{(0)}$ (FT)
MW-19	0.002411	0.1986
MW-19-5	0.0004417	0.1504
MW-19-6	0.001852	0.2292
MW-19-7	1.524	1
MW-19-11	0.0023	0.1036

Figures

RMT COMPUTER AIDED DESIGN AND DRAFTING



NEW JERSEY

QUADRANGLE LOCATION

N

0 2000' 4000'

APPROXIMATE SCALE IN FEET

SOURCE

BASE MAP DEVELOPED FROM THE DOVER, NEW JERSEY 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 1954, PHOTOREVISED 1981.

RMT INC.

LE CARPENTER
WHARTON, NEW JERSEY

SITE LOCATION MAP

DRAWN BY:	SL
APPROVED BY:	NC
PROJECT NUMBER:	6527.28
FILE NUMBER:	6527.28.01.DWG
DATE:	August 2007

FIGURE 1

PLOT DATA
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Dwg Size: 96645 Bytes
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Plot Time: 08:33.0442 AM
Attached Xref's: No xref's Attached.

RMT COMPUTER AIDED DESIGN AND DRAFTING

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Dwg Size: 0.25 Mb
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RMTEMP
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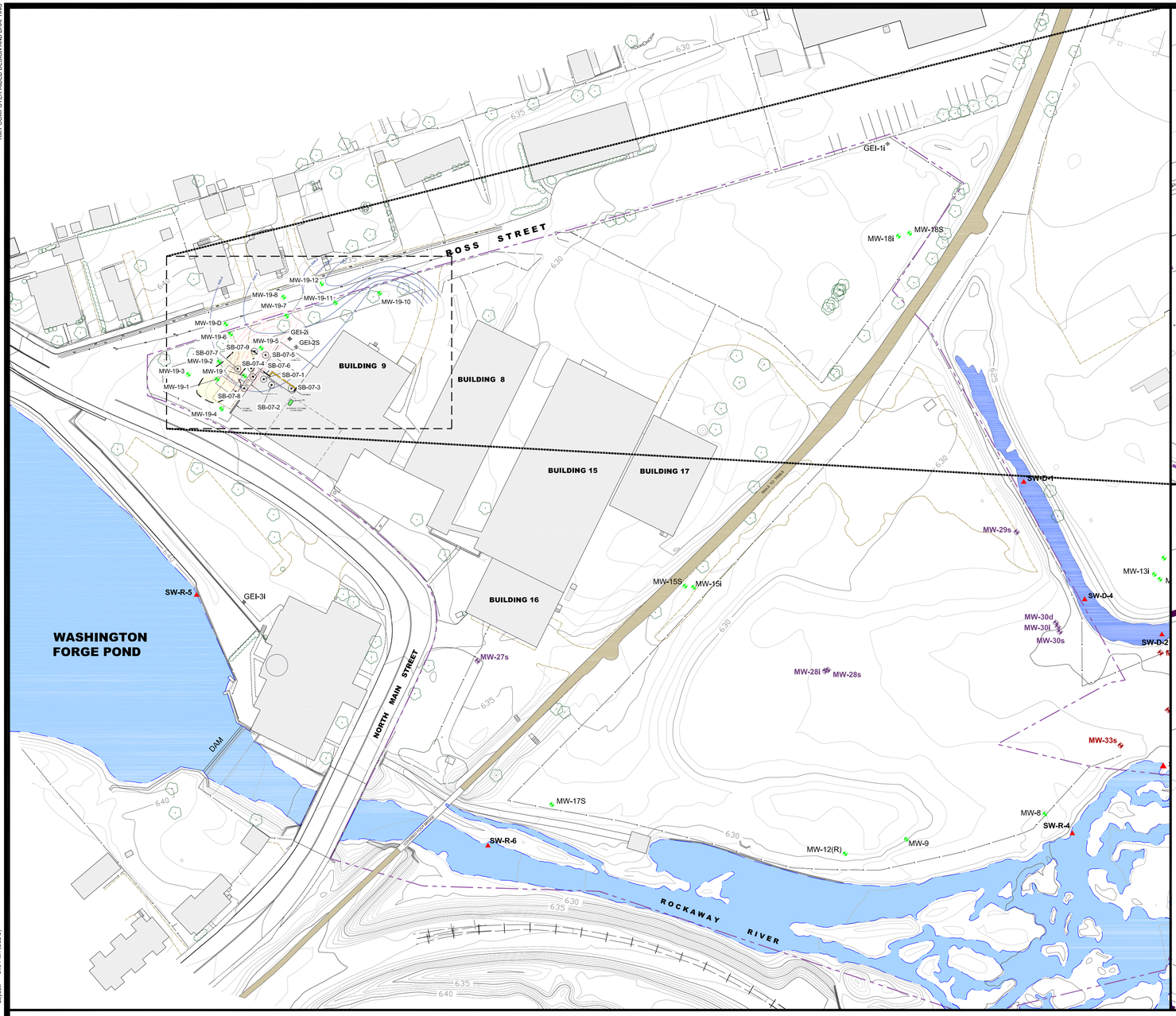
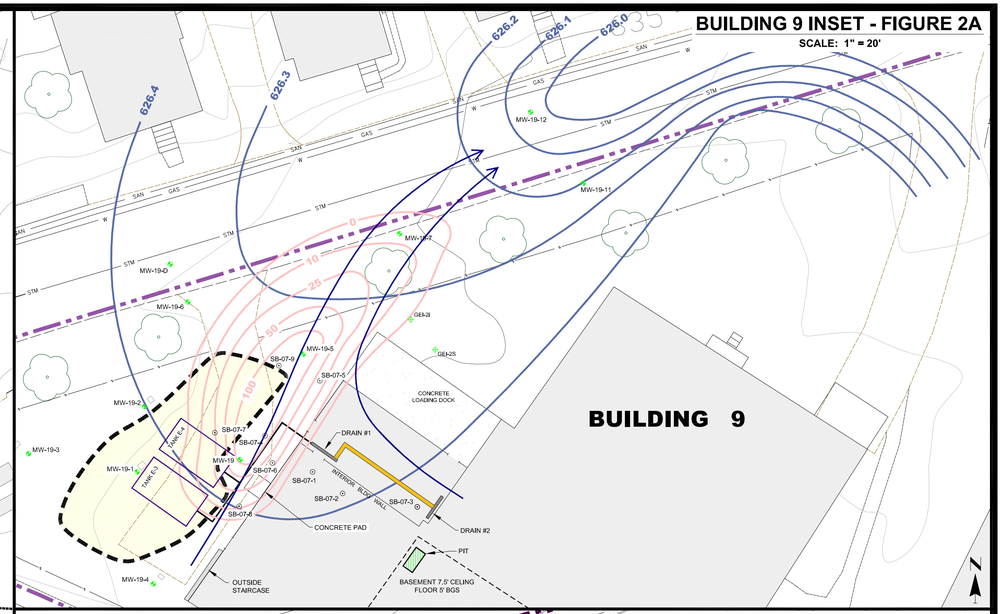
Drawing Plot Scale:



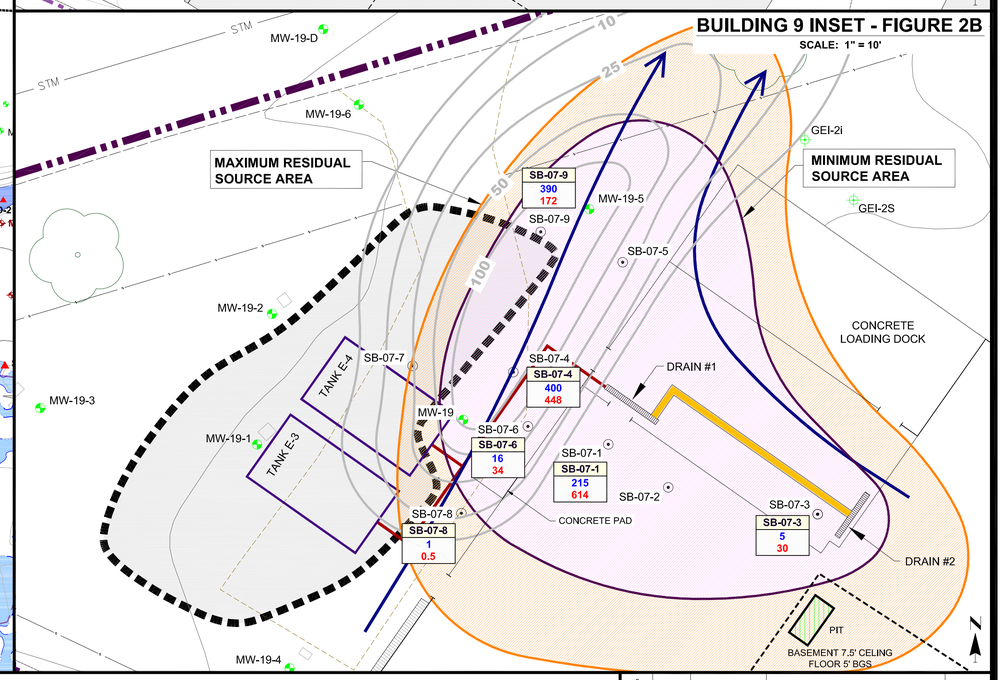
BUILDING 9 INSET - FIGURE 2A

SCALE: 1" = 20'



BUILDING 9 INSET - FIGURE 2B

SCALE: 1" = 10'



LEGEND

- APPROXIMATE PROPERTY LINE
- FENCE LINE
- TREES
- MW-25(R) — MONITORING WELL LOCATION AND NUMBER
- GEI-2i — PIEZOMETER LOCATION
- 626 — GROUNDWATER ELEVATION CONTOUR (2Q07)
- 10 — ISOCONCENTRATION CONTOUR FOR TOTAL MAXIMUM BTEX (ppm) IN GROUNDWATER (2Q07)
- 1994 SOIL EXCAVATION (WESTON)
- ABANDONED PIPE FLOOR CONNECTION BETWEEN 2 FLOOR DRAINS (APPROX. 2ft. WIDE)
- MW-29s — INSTALLED NON-WETLAND MONITORING WELL LOCATION AND NUMBER (JUNE 2006) (s = shallow, I = Intermediate, d = deep)
- MW-31s — PROPOSED WETLAND MONITORING WELL LOCATION AND NUMBER (s = shallow)
- SW-R-1 — SURFACE WATER SAMPLING LOCATION (D = DITCH; R = RIVER)
- SB-07-01 — RASR SOIL BORING (RMT AUGUST 2007)
- FORMER PRODUCTION TRENCH DRAIN
- FORMER PRODUCTION PIT (BASE OF PIT NOT IN CONNECTION WITH SUBSURFACE SOILS BUT RATHER IN BUILDING 9 SUBBASEMENT)
- TANK E-3 — FORMER UNDERGROUND STORAGE TANK (WESTON 1990 - 1991)

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BY JAMES M.STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED 02-14-02 AS REVISED 04-10-07 (DRAWING NO. 314907REV.DWG).
2. FORMER BUILDING OPERATIONS
   - BUILDING 9: RAW MATERIAL, DRUM STORAGE, AND PRINTING
   - BUILDING 8: LAMINATION
   - BUILDING 15 and 17: INSPECTION, STORAGE, AND DISTRIBUTION
   - BUILDING 16: OFFICES
3. LOCATION OF 1994 WESTON SOIL EXCAVATION AND FORMER UST E-3 AND E-4 APPROXMATED BASED ON HISTORICAL SCALED DRAWINGS.

LEGEND (FIGURES 2A AND 2B)

- APPROXIMATE PROPERTY LINE
- FENCE LINE
- TREES
- MW-25(R) — MONITORING WELL LOCATION AND NUMBER
- GEI-2i — PIEZOMETER LOCATION
- 626 — GROUNDWATER ELEVATION CONTOUR (2Q07)
- 10 — ISOCONCENTRATION CONTOUR FOR TOTAL MAXIMUM BTEX (ppm) IN GROUNDWATER (2Q07)
- APPROXIMATE AREA OF 1994 SOIL EXCAVATION (WESTON)
- MAXIMUM RESIDUAL SOURCE AREA
- MINIMUM RESIDUAL SOURCE AREA
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- SB-07-4 — BORING ID
- 400 — TOTAL SVOC's IN SMEAR ZONE SOIL (mg/kg)
- 448 — TOTAL VOC's IN SMEAR ZONE SOIL (mg/kg)

0 60' 120' 180' 240'
SCALE IN FEET

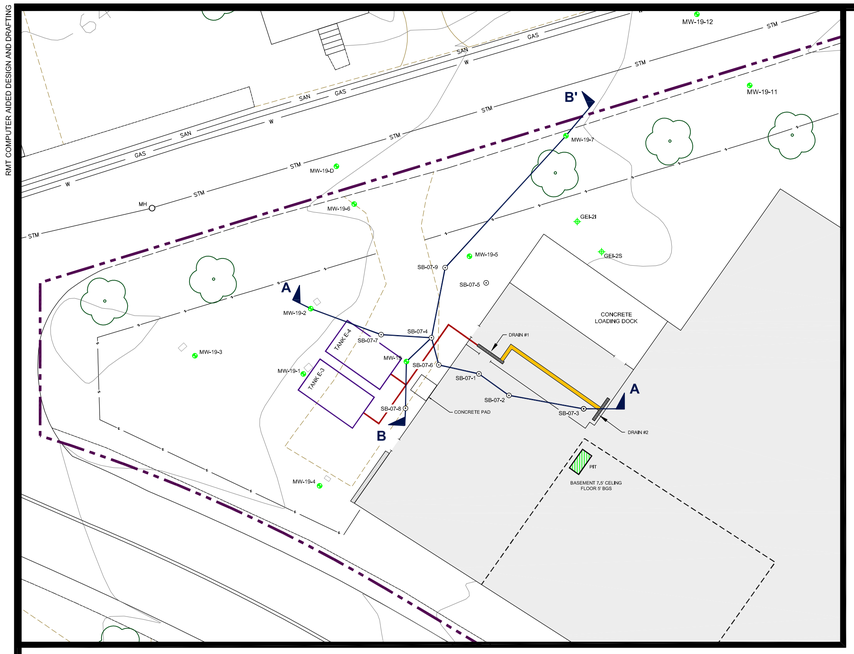
NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

SITE PLAN AND MW-19 HOT SPOT 1
RASR RESIDUAL SOURCE INVESTIGATION

DRAWN BY:	SL	DRAWING SCALE:	PROJECT NO. J:\06527\28
CHECKED BY:	EVJO	SHOWN	FILE NO. 6527.28.02.dwg
APPROVED BY:	JD	DATE PRINTED:	**FIGURE 2**
DATE:	August 2007		

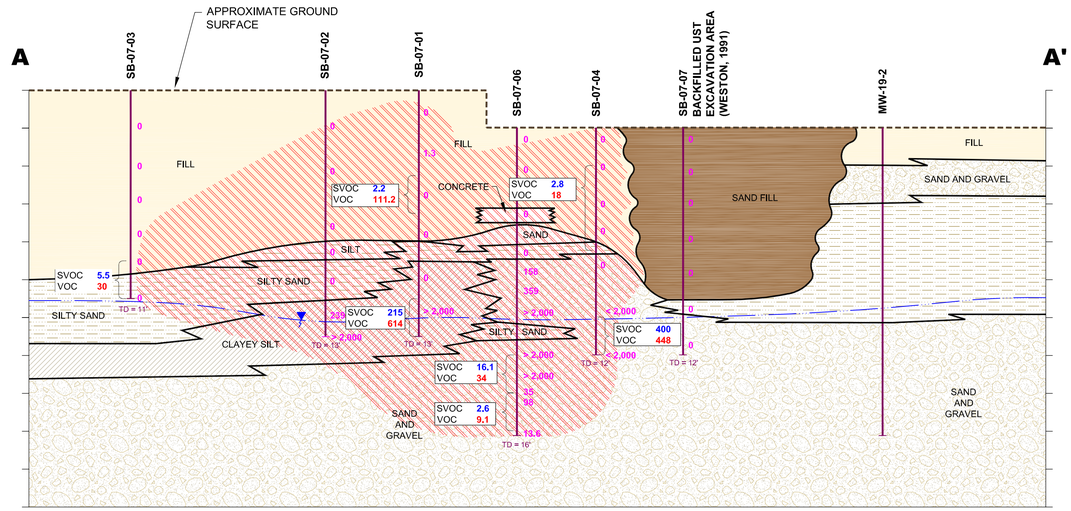
RMT INC.
3754 Rancheo Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022



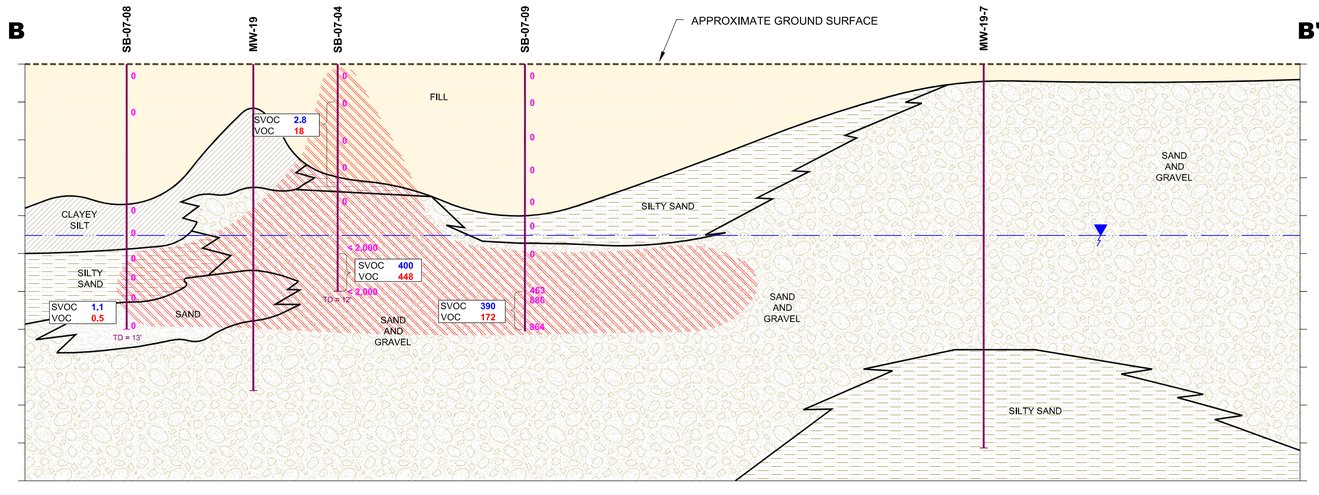
CROSS SECTION LOCATION MAP

SCALE: 1" = 20'

GEOLOGIC CROSS SECTION A - A'



GEOLOGIC CROSS SECTION B - B'



LEGEND

- APPROXIMATE GROUND SURFACE
- APPROXIMATE STRATIGRAPHIC CONTACT
- APPROXIMATE GROUND SURFACE
- 886 PHOTOIONIZATION DETECTOR (PID) READING (QUALITATIVE TOTAL ppm)
- FILL
- SAND
- SAND AND GRAVEL
- SILTY SAND
- CLAYEY TO SANDY SILT
- CONCRETE
- SVOC 390 / VOC 172 — TOTAL SVOCs / TOTAL VOCs
- AREAS OF RESIDUAL SOIL CONTAMINATION BASED ON FIELD OBSERVATIONS AND LABORATORY DATA

NOTES

1. TOTAL SVOC AND VOCs IN mg/kg (ppm).

VERTICAL SCALE: 8', 4', 0

HORIZONTAL SCALE: 0, 8', 16'

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

SITE CROSS SECTIONS

DRAWN BY:	SL	DRAWING SCALE:	PROJECT NO. J:\06527\28
CHECKED BY:	EV	SHOWN	FILE NO. 6527.28.03.dwg
APPROVED BY:	JD	DATE PRINTED:	**FIGURE 3**
DATE:	August 07		

RMT INC.
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

Appendix A
Report Certification

REPORT CERTIFICATION
PURSUANT TO N.J.A.C. 7:26E-1.5

"I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement, which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties."

Mr. Cristopher R. Anderson

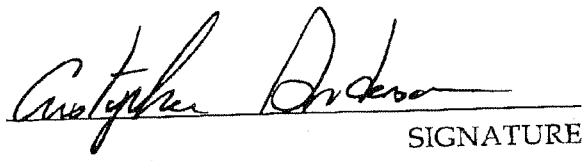
PRINTED NAME

Director, Environmental Services

TITLE

L.E. Carpenter & Company

COMPANY



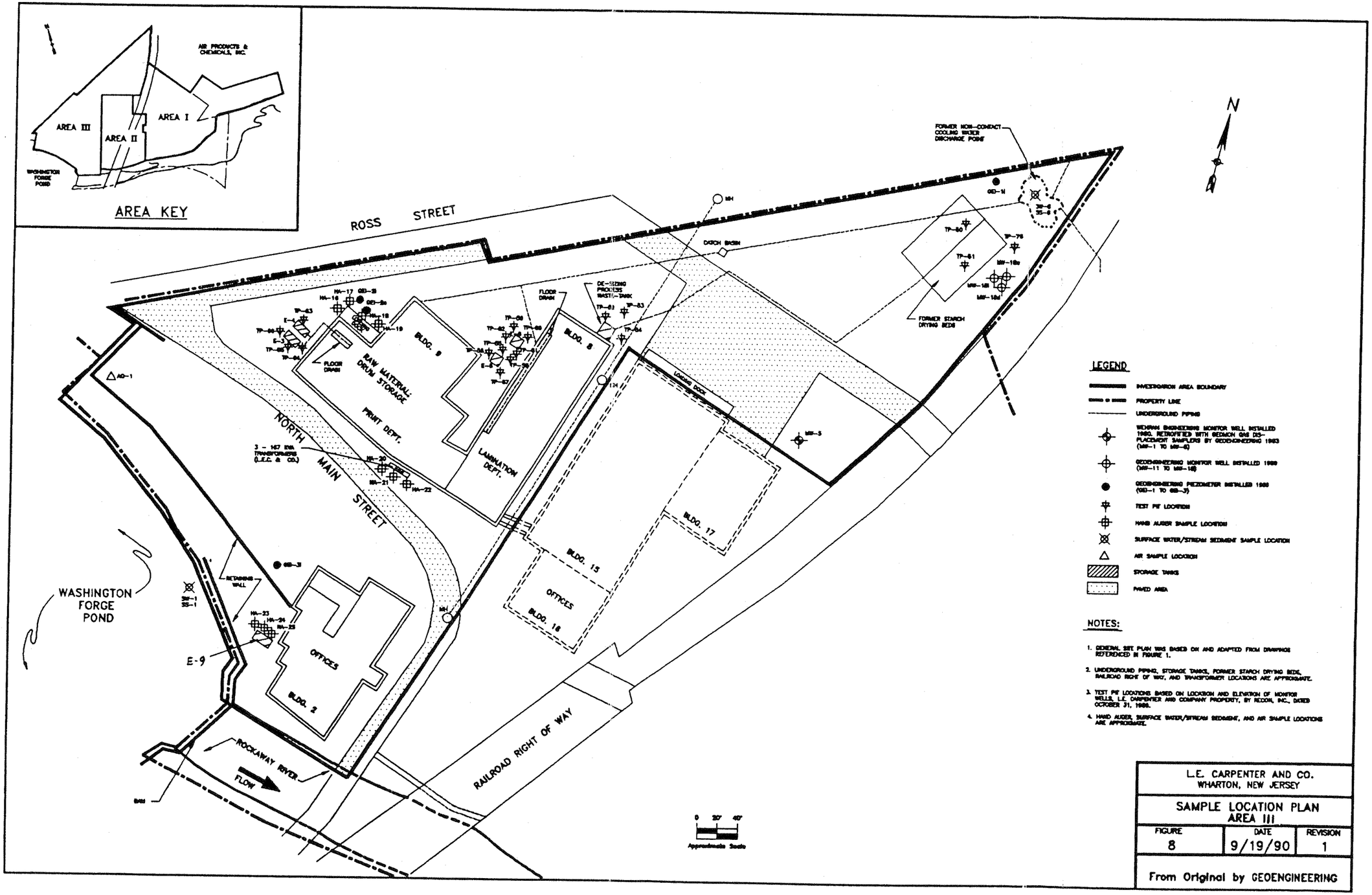
SIGNATURE

8/29/07

DATE

Appendix B
1990 Area III Map

WESTON
MANAGERS DESIGNERS/CONSULTANTS



NOTES:

1. GENERAL SITE PLAN WAS BASED ON AND ADAPTED FROM DRAWINGS REFERENCED IN FIGURE 1.
2. UNDERGROUND PIPING, STORAGE TANKS, FORMER STARCH DRYING BEDS, RAILROAD RIGHT OF WAY, AND TRANSFORMER LOCATIONS ARE APPROXIMATE.
3. TEST PIT LOCATIONS BASED ON LOCATION AND ELEVATION OF MONITOR WELLS, L.E. CARPENTER AND COMPANY PROPERTY, BY RECON, INC., DATED OCTOBER 31, 1988.
4. HAND AUGER, SURFACE WATER/STREAM SEDIMENT, AND AIR SAMPLE LOCATIONS ARE APPROXIMATE.

L.E. CARPENTER AND CO.
WHARTON, NEW JERSEY

SAMPLE LOCATION PLAN
AREA III

FIGURE	DATE	REVISION
8	9/19/90	1

From Original by GEOENGINEERING

Appendix C
Boring Logs

SOIL BORING LOG

RMT INC.

BORING NO. SB-07-01

Page 1 of 1

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/17/07	8/17/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Casing		---	12.5	4

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Dave	Acker Electric Stringray

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/17/07 00:00 ▽ Depth (ft bgs) 12 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
				Concrete.		/// ///	0	
1 SS	40	3 2 1 1	2	**Fill,** mostly find sand, some medium sand, trace coarse sand, slag material present, 10YR 3/2 to 10YR 2/1 very dark grayish brown to black, dry, loose, no odor.			0	
2 SS	8	1 2 3 8	4	Slight odor dectected at 3.5'.	SW		1.3	Sample collected 4.5-6.5'.
3 SS	29	7 7 14 22	6				0 0	
4 SS	29	18 16 7 26	8				0	
				Silty Sand, mostly fine sand, some silt, 10YR 4/4 dark yellowish brown, moist, compact, no odor.	SP-SM		0	
5 SS	8	126 18 100 119	10	**Sandy Silt,** mostly silt, some fine sand, 10YR 4/4 dark yellowish brown, moist, compact, no odor.	ML		0	
6 SS	50	16 17 40 64	12 ▽	**Sandy Silt,** mostly silt, little fine sand, gray clay mixed throughout, 10YR 4/4 dark yellowish brown, moist, stiff, very strong odor. Very tip of split-spoon contains coarse sand and gravel.	ML		> 2,000 > 2,000	Sample collected 11-13'.
			14 16 18	End of boring 13.0' bgs.				

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

Checked By: J'D

Firm: RMT Inc. 616-975-5415
2025 E. Beltline Ave. Suite 402 Grand Rapids, MI Fax 616-975-1098

SOIL BORING LOG

RMT INC.

BORING NO. SB-07-02

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/17/07	8/17/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Casing		---	13.0	4

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Dave	Acker Electric Stringray

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/17/07 00:00 ▽ Depth (ft bgs) 12 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
			0	**Concrete.**		///		
1 SS	17	2 2 2 2	2	**Fill,** well sorted, mostly medium sand, some coarse sand, little fine sand, slag, 10YR 2/1 black, dry, loose, no odor.	SP		0 0	
2 SS	38	1 4 12 14	4				0 0	
3 SS	42	3 3 3 14	6				0 0	
4 SS	21	9 10 12 35	8				0 0	
5 SS	46	25 9 12 22	10	**Sandy Silt,** mostly silt, some fine sand, cobbles, 10YR 4/4 dark yellowish brown, dry, soft, no odor.	ML		0 0	Sample collected 9-11'.
6 SS	33	22 24 15 23	12	**Silty Sand,** mostly fine sand, some medium sand, little coarse sand, some silt, 10YR 4/4 dark yellowish brown, moist, compact, no odor. Silt increases with depth.	SW-SM		0 0	
				Clayey Silt, gray	MH		239	Sample collected 11-13'.
				▽ **Sandy Silt,** with trace clay, wet, very hard, strong odor.	ML		> 2,000	
			14	End of boring 13.0' bgs.				
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: JD

Checked By:

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RMT INC.

SOIL BORING LOG

BORING NO. SB-07-03

Page 1 of 1

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/17/07	8/17/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Casing		---	11.0	4

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Dave	Acker Electric Stringray

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/17/07 00:00 ▽ Depth (ft bgs) 11 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
			0	**Concrete.**				
				No recovery. Slag material in tip of spoon.				
			2					
1 SS	38	NM		**Slag.**				
			4					
2 SS	33	3 3 3 4	6				0	
3 SS	50	5 4 5 6	8	Some brick fragments.			0 0 0	
4 SS	25	20 12 15 29	10	**Sandy Slag,** mixture of slag and sand.			0	Sample collected 9-11'.
				Well Graded Sand, mostly sand, some silt, 10YR 4/3 brown, wet, loose, no odor. ▽	SW		0	
5 SS	33	100		End of boring 11.3' bgs.			0	
			12					
			14					
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

Checked By: JD

Firm: RMT Inc. 616-975-5415
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SOIL BORING LOG

BORING NO. SB-07-04

Facility/Project Name	Date Drilling Started	Date Drilling Completed	Project Number
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm	Drilling Method	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	12.0	4.875

Boring Location	Personnel	Drilling Equipment
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village	County	State	Water Level Observations
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 10 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
		6		**Topsoil.**				
1 SS	50	8 5 6		**Fill,** well graded, mostly fine sand, little medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, dry, loose, no odor.	SW		0 0	
2 SS	25	12 14 15 10	2	**Fill,** well graded, mostly medium sand, some coarse sand, few find sand, alternating layers of 10YR 2/1 to 10YR 4/4 black and dark yellowish brown, dry, loose, no odor.			0	Sample collected 2-6.5'.
3 SS	25	11 7 8 8	4		SW		0 0	
4 SS	33	16 35/0	6	Soils grade to contain some silt and become moist. **No Recovery,** drill through cobble layer.			0	
5 SS	25	15 30 47 92	8	**Sand,** ground cobble.	SW		0	
				▽ **Sand,** mostly fine sand, little medium sand, trace silt, trace cobble, 10YR 4/4 dark yellowish brown, compact, moist, no odor.	SP		0	
6 SS	75	18 38 55 63	10	**Sand with Gravel,** mostly find sand, some medium sand, trace gravel, dense, wet, very strong odor.	SW		> 2,000 > 2,000 > 2,000	Sample collected 10-12'. Odor smells of aerosol spray paint.
			12	End of boring 12.0' bgs.				
			14					
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

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SOIL BORING LOG

BORING NO. SB-07-05

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	9.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 8.5 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
1 SS	54	5 8 12 10		**Fill,** well graded, mostly fine sand, little medium sand, trace coarse sand, 7.5YR 2.5/3 very dark brown, dry, loose, no odor.	SW		0	
				Brick Fragments.			0	
		10 7	2	**Well Graded Sand,** mostly medium sand, little coarse sand, trace fine sand, 7.5YR 3/1 very dark gray, dry, loose, no odor.	SW		0	
2 SS	25	7 10		**Silt with Gravel,** mostly silt, trace gravel, 7.5YR 3/3 dark brown, soft, moist, no odor.	ML		0	
3 SS	0	3 6	4	**No Recovery,** brick and cobble in spoon tip.				
		25/0		**Cobbles,** rotary drill through cobble layer.				
			6					
4 SS	94	7 15 50/5	8	**Well Graded Sand,** mostly find sand, some medium sand, trace coarse sand, 10YR 3/2 very dark grayish brown, moist, loose, no odor.	SW		0	Sample collected 7.5-9'.
				Silty Sand, mostly find sand, some silt, trace coarse sand and gravel, cobble, wet, loose, no odor.	SP-SM		0	
			10	End of boring 9.0' bgs.				
			12					
			14					
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

Checked By: JD

Firm: RMT Inc. 616-975-5415
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SOIL BORING LOG

BORING NO. SB-07-06

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	16.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 8 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
1 SS	54	2 2 2 3	0	**Fill,** mostly fine sand, little medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, dry, loose, no odor.	SW		0 0	
2 SS	44	10 12 34 37/0	2				0 0	
			4	**Fill,** mostly fine sand, trace medium and coarse sand, trace gravel, layers of 10YR 3/4 with 10YR 2/1 dark yellowish brown with black, dry, loose, no odor. **Cobbles,** possible concrete layer.	SP			
3 SS	38	10 12 12 17	6	**Poorly Graded Sand,** mostly fine sand, trace medium and coarse sand, trace gravel, layers of 10YR 3/4 with 10YR 2/1 dark yellowish brown with black, dry, loose, no odor. **Silty Sand,** mostly fine sand, some silt, trace medium sand, 10YR 3/4 dark yellowish brown, dry grading to moist, loose, no odor.	SP SP-SM		0 0	Sample collected 5-7'.
4 SS	21	11 15 22 62	8	▽ **Well Graded Sand,** mostly fine sand, some medium sand, trace coarse sand, loose, moist to wet, strong odor. Silt and coarse sand increase with depth.	SW		158 359 > 2,000	Sample collected 9-11'.
5 SS	92	27 55 42 67	10	Soils become compact.			> 2,000 > 2,000	
			12					
6 SS	54	13 16 16 14	14				> 2,000	Sample collected 12-14'.
7 SS	63	11 18 15 22	16	**Poorly Graded Sand,** mostly fine sand, 10YR 2/1 black, loose, wet, some odor.	SP		35.3 98	Sample collected 14-16'.
			18	**Well Graded Sand,** mostly fine sand, some medium sand, little coarse sand, 10YR 5/4 yellowish brown, loose, wet, slight odor. End of boring 16.0' bgs.	SW		13.6	

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

Checked By: JD

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-07

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	12.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 9.5 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
		10		**Topsoil.**			0	
1 SS	83	9 9 9		**Fill,** well graded, mostly fine sand, few medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, loose dry, no odor.			0 0	
			2					
2 SS	58	7 5 6 11					0 0	
			4					
3 SS	54	11 13 15 15			SW		0 0	Sample collected 4-6'.
			6					
4 SS	71	14 13 13 11		Soil grades to moist.			0 0	Sample collected 7-9'.
			8					
5 SS	75	9 7 7 8		▽ Soil grades to wet.	SW-SM		0 0	
			10	**Silty Sand,** mostly fine sand, some silt, few medium sand, trace coarse sand and gravel, 7.5YR 5/8 strong brown, loose, wet, no odor.	SW		0	Sample collected 10-12'.
6 SS	38	12 14 21 24		**Well Graded Sand,** mostly medium sand, some fine sand, trace coarse sand, shale and black sand intervals, 10YR 4/4 dark yellowish brown, loose, wet, no odor.			0	
			12	End of boring 12.0' bgs.				
			14					
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

Checked By: JD

Firm: RMT Inc. 616-975-5415
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SOIL BORING LOG

BORING NO. SB-07-08

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	14.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 11.0 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
1 SS	8	5 2 2 1	2	**Fill**, poorly graded, mostly fine sand, trace medium sand, 7.5YR 4/6 strong brown, dry, loose, no odor.	SP		0	
2 SS	8	2 3 3 6	4				0	
3 SS	0	7 6 6 3	6	**No Recovery.**			NA	
4 SS	42	7 8 24 48	8	**Fill**, poorly graded, mostly fine sand, trace medium sand, 7.5YR 4/6 strong brown, dry, loose, no odor.	SP		0	
				Slag, and cobble, black.			0	
5 SS	29	18 18 20 21	10	**Elastic Silt**, mostly silt, little clay, few fine sand, trace coarse sand, 10YR 4/6 dark yellowish brown, moist, soft, no odor.	MH		0	Sample collected 8-10'.
6 SS	54	14 24 28 50	12	**Silty Sand**, mostly fine sand, little silt, few medium sand, cobbles, moist to wet, dense, no odor. ▽	SM		0	Sample collected 10-12'.
7 SS	83	24 36 48 45	14	**Well Graded Sand**, mostly medium sand, some fine sand, trace coarse sand, 10YR 4/2 dark grayish brown, wet, compact, no odor. Color grades to 10YR 2/1 black. End of boring 14.0' bgs.	SW		0	Sample collected 12-14'.
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: JD

Checked By: JD

Firm: RMT Inc. 616-975-5415
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SOIL BORING LOG

BORING NO. SB-07-09

Page 1 of 1

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	14.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 10 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
		5		**Topsoil.**				
1 SS	58	4 2 2	2	**Fill,** well graded, mostly fine sand, few medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, dry, loose, no odor.			0 0	
2 SS	67	4 2 3 2	4				0 0	Sample collected 2-4'.
3 SS	50	6 7 6 7		Soils grade to moist.	SW		0 0	
4 SS	46	7 7 10 10	6				0 0	
5 SS	33	22 41	8	**Silty Sand with Cobbles,** mostly sand, some silt, 10YR 5/6 yellowish brown, moist, soft, no odor.	SM		0	
		89/5	10	▽ **Cobbles,** rotor through cobble layer, no odor in wash water.			0	
6 SS	50	24 51 48 55	12	**Poorly Graded Sand,** mostly fine sand, little medium sand, gravel, 10YR 5/4 yellowish brown, wet, compact grading to very dense, strong odor.	SP		463 886 864	Sample collected 12-14'.
			14	End of boring 14.0' bgs.				
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

Checked By: JD

Firm: RMT Inc. 616-975-5415
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Appendix D
Laboratory Analytical Report

TriMatrix
Laboratories, Inc.

August 24, 2007

RMT, Inc. - Grand Rapids Office
Attn: Jennifer Overvoord
2025 E. Beltline Ave., Suite 402
Grand Rapids, MI 49546

Project: L.E. Carpenter

Dear Jennifer Overvoord,

Enclosed is a copy of the laboratory report, comprised of the following work order(s), for test samples received by TriMatrix Laboratories:

Work Order	Received	Description
0708383	08/20/2007	Laboratory Services

This report relates only to the sample(s), as received. Test results are in compliance with the requirements of the National Environmental Laboratory Accreditation Conference (NELAC); any qualifications of results, including sample acceptance requirements, are explained in the Statement of Data Qualifications.

Estimates of analytical uncertainties for the test results contained within this report are available upon request.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Jennifer L. Rice
Project Chemist

Enclosures(s)

The total number of pages in this report, including this page, is 87.

ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	86		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<1.7	1.7
107-02-8	Acrolein	<0.58	0.58
107-13-1	Acrylonitrile	<0.58	0.58
71-43-2	Benzene	<0.12	0.12
108-86-1	Bromobenzene	<0.12	0.12
74-97-5	Bromochloromethane	<0.12	0.12
75-27-4	Bromodichloromethane	<0.12	0.12
75-25-2	Bromoform	<0.12	0.12
74-83-9	Bromomethane	<0.12	0.12
104-51-8	n-Butylbenzene	<0.12	0.12
135-98-8	sec-Butylbenzene	<0.12	0.12
98-06-6	tert-Butylbenzene	<0.12	0.12
75-15-0	Carbon Disulfide	<0.58	0.58
56-23-5	Carbon Tetrachloride	<0.12	0.12
108-90-7	Chlorobenzene	<0.12	0.12
75-00-3	Chloroethane	<0.12	0.12
110-75-8	2-Chloroethyl Vinyl Ether	<0.58	0.58
67-66-3	Chloroform	<0.12	0.12
544-10-5	1-Chlorohexane	<0.12	0.12
74-87-3	Chloromethane	<0.12	0.12
95-49-8	2-Chlorotoluene	<0.12	0.12
106-43-4	4-Chlorotoluene	<0.12	0.12
110-82-7	Cyclohexane	<0.58	0.58
96-12-8	1,2-Dibromo-3-chloropropane	<0.58	0.58
124-48-1	Dibromochloromethane	<0.12	0.12
106-93-4	1,2-Dibromoethane	<0.12	0.12
74-95-3	Dibromomethane	<0.12	0.12
110-57-6	trans-1,4-Dichloro-2-butene	<0.58	0.58
95-50-1	1,2-Dichlorobenzene	<0.12	0.12
541-73-1	1,3-Dichlorobenzene	<0.12	0.12
106-46-7	1,4-Dichlorobenzene	<0.12	0.12

Continued on next page

*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	86		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<0.12	0.12
75-34-3	1,1-Dichloroethane	<0.12	0.12
107-06-2	1,2-Dichloroethane	<0.12	0.12
75-35-4	1,1-Dichloroethene	<0.12	0.12
156-59-2	cis-1,2-Dichloroethene	<0.12	0.12
156-60-5	trans-1,2-Dichloroethene	<0.12	0.12
75-43-4	Dichlorofluoromethane	<0.12	0.12
78-87-5	1,2-Dichloropropane	<0.12	0.12
142-28-9	1,3-Dichloropropane	<0.12	0.12
594-20-7	2,2-Dichloropropane	<0.12	0.12
563-58-6	1,1-Dichloropropene	<0.12	0.12
10061-01-5	cis-1,3-Dichloropropene	<0.12	0.12
10061-02-6	trans-1,3-Dichloropropene	<0.12	0.12
100-41-4	Ethylbenzene	**0.64**	0.12
60-29-7	Ethyl Ether	<0.12	0.12
142-82-5	Heptane	<0.58	0.58
87-68-3	Hexachlorobutadiene	<0.12	0.12
67-72-1	Hexachloroethane	<0.58	0.58
591-78-6	2-Hexanone	<5.8	5.8
74-88-4	Iodomethane	<0.58	0.58
67-63-0	Isopropanol	<5.8	5.8
98-82-8	Isopropylbenzene	<0.12	0.12
99-87-6	4-Isopropyltoluene	<0.12	0.12
79-20-9	Methyl Acetate	<0.58	0.58
1634-04-4	Methyl tert-Butyl Ether	<0.12	0.12
108-87-2	Methylcyclohexane	<0.58	0.58
75-09-2	Methylene Chloride	<0.58	0.58
78-93-3	2-Butanone (MEK)	<5.8	5.8
91-57-6	2-Methylnaphthalene	<0.58	0.58
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.8	5.8
91-20-3	Naphthalene	<0.58	0.58

Continued on next page

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5560 Corporate Exchange Court SE • Grand Rapids, MI 49512 • (616) 975-4500 • Fax (616) 942-7463

ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	86		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	<0.12	0.12
100-42-5	Styrene	<0.12	0.12
630-20-6	1,1,1,2-Tetrachloroethane	<0.12	0.12
79-34-5	1,1,2,2-Tetrachloroethane	<0.12	0.12
127-18-4	Tetrachloroethene	<0.12	0.12
109-99-9	Tetrahydrofuran	<0.58	0.58
108-88-3	Toluene	**14**	0.12
87-61-6	1,2,3-Trichlorobenzene	<0.12	0.12
120-82-1	1,2,4-Trichlorobenzene	<0.12	0.12
71-55-6	1,1,1-Trichloroethane	<0.12	0.12
79-00-5	1,1,2-Trichloroethane	<0.12	0.12
79-01-6	Trichloroethene	<0.12	0.12
75-69-4	Trichlorofluoromethane	<0.12	0.12
96-18-4	1,2,3-Trichloropropane	<0.12	0.12
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<0.12	0.12
95-63-6	1,2,4-Trimethylbenzene	<0.12	0.12
108-67-8	1,3,5-Trimethylbenzene	<0.12	0.12
108-05-4	Vinyl Acetate	<0.58	0.58
75-01-4	Vinyl Chloride	<0.12	0.12
1330-20-7	Xylene (Total)	**3.4**	0.35

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	102	*75-123*
1,2-Dichloroethane-d4	95	*83-116*
Toluene-d8	98	*85-113*
4-Bromofluorobenzene	103	*81-117*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	86		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<0.039	0.039
208-96-8	Acenaphthylene	<0.039	0.039
98-86-2	Acetophenone	**0.16**	0.039
62-53-3	Aniline	<0.077	0.077
120-12-7	Anthracene	<0.039	0.039
1912-24-9	Atrazine	<0.039	0.039
100-52-7	Benzaldehyde	<0.077	0.077
92-87-5	Benzidine	<1.6	1.6
56-55-3	Benzo(a)anthracene	<0.039	0.039
50-32-8	Benzo(a)pyrene	<0.039	0.039
205-99-2	Benzo(b)fluoranthene	<0.039	0.039
207-08-9	Benzo(k)fluoranthene	<0.039	0.039
191-24-2	Benzo(g,h,i)perylene	<0.077	0.077
65-85-0	Benzoic Acid	<0.16	0.16
100-51-6	Benzyl Alcohol	<0.039	0.039
92-52-4	1,1'-Biphenyl	<0.039	0.039
101-55-3	4-Bromophenyl Phenyl Ether	<0.039	0.039
85-68-7	Butyl Benzyl Phthalate	**0.088**	0.077
105-60-2	Caprolactam	<0.077	0.077
86-74-8	Carbazole	<0.039	0.039
59-50-7	4-Chloro-3-methylphenol	<0.039	0.039
95-51-2	2-Chloroaniline	<0.039	0.039
106-47-8	4-Chloroaniline	<0.077	0.077
111-91-1	Bis(2-chloroethoxy)methane	<0.039	0.039
111-44-4	Bis(2-chloroethyl) Ether	<0.039	0.039
108-60-1	Bis(2-chloroisopropyl) Ether	<0.039	0.039
91-58-7	2-Chloronaphthalene	<0.039	0.039
95-57-8	2-Chlorophenol	<0.039	0.039
7005-72-3	4-Chlorophenyl Phenyl Ether	<0.039	0.039

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	86		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	<0.039	0.039
53-70-3	Dibenz(a,h)anthracene	<0.077	0.077
132-64-9	Dibenzofuran	<0.039	0.039
84-74-2	Di-n-butyl Phthalate	<0.039	0.039
106-46-7	1,4-Dichlorobenzene	<0.039	0.039
95-50-1	1,2-Dichlorobenzene	<0.039	0.039
541-73-1	1,3-Dichlorobenzene	<0.039	0.039
91-94-1	3,3´-Dichlorobenzidine	<0.39	0.39
120-83-2	2,4-Dichlorophenol	<0.039	0.039
87-65-0	2,6-Dichlorophenol	<0.039	0.039
84-66-2	Diethyl Phthalate	<0.039	0.039
105-67-9	2,4-Dimethylphenol	<0.039	0.039
131-11-3	Dimethyl Phthalate	<0.039	0.039
534-52-1	4,6-Dinitro-2-methylphenol	<0.16	0.16
51-28-5	2,4-Dinitrophenol	<0.16	0.16
606-20-2	2,6-Dinitrotoluene	<0.039	0.039
121-14-2	2,4-Dinitrotoluene	<0.039	0.039
117-84-0	Di-n-octyl Phthalate	<0.039	0.039
122-66-7	1,2-Diphenylhydrazine	<0.039	0.039
117-81-7	Bis(2-ethylhexyl) Phthalate	**1.8**	0.077
206-44-0	Fluoranthene	<0.039	0.039
86-73-7	Fluorene	<0.039	0.039
118-74-1	Hexachlorobenzene	<0.039	0.039
87-68-3	Hexachlorobutadiene	<0.039	0.039
77-47-4	Hexachlorocyclopentadiene	<0.039	0.039
67-72-1	Hexachloroethane	<0.039	0.039
193-39-5	Indeno(1,2,3-cd)pyrene	<0.077	0.077
78-59-1	Isophorone	<0.039	0.039
91-57-6	2-Methylnaphthalene	<0.039	0.039
90-12-0	1-Methylnaphthalene	<0.039	0.039
* 106-44-5	4-Methylphenol	**0.12**	0.039

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	86		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	**0.44**	0.039
91-20-3	Naphthalene	**0.17**	0.039
100-01-6	4-Nitroaniline	<0.16	0.16
88-74-4	2-Nitroaniline	<0.039	0.039
99-09-2	3-Nitroaniline	<0.077	0.077
98-95-3	Nitrobenzene	<0.039	0.039
88-75-5	2-Nitrophenol	<0.039	0.039
100-02-7	4-Nitrophenol	<0.077	0.077
62-75-9	N-Nitroso-dimethylamine	<0.077	0.077
86-30-6	N-Nitroso-diphenylamine	<0.039	0.039
621-64-7	N-Nitroso-di-n-propylamine	<0.039	0.039
87-86-5	Pentachlorophenol	<0.039	0.039
85-01-8	Phenanthrene	<0.039	0.039
108-95-2	Phenol	<0.039	0.039
129-00-0	Pyrene	<0.039	0.039
110-86-1	Pyridine	<0.039	0.039
95-94-3	1,2,4,5-Tetrachlorobenzene	<1.2	1.2
58-90-2	2,3,4,6-Tetrachlorophenol	<0.077	0.077
120-82-1	1,2,4-Trichlorobenzene	<0.039	0.039
95-95-4	2,4,5-Trichlorophenol	<0.039	0.039
88-06-2	2,4,6-Trichlorophenol	<0.039	0.039

Surrogates	***% Recovery***	***Control Limits***
2-Fluorophenol	45	*40-105*
Phenol-d6	51	*44-104*
Nitrobenzene-d5	105	*47-118*
2-Fluorobiphenyl	80	*48-119*
2,4,6-Tribromophenol	81	*36-120*
o-Terphenyl	97	*45-130*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	86		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
*Arsenic	**5.3**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
*Barium	**140**	0.50	mg/kg dry wt.	5	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**1.9**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
*Chromium	**32**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
Lead	**24**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Mercury	**0.063**	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
*Selenium	**0.89**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
Silver	**0.13**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 2-6.5**	Sampled:	08/16/07 10:55
Lab Sample ID:	**0708383-01**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**86**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	40	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<34	34
107-02-8	Acrolein	<11	11
107-13-1	Acrylonitrile	<11	11
71-43-2	Benzene	<2.2	2.2
108-86-1	Bromobenzene	<2.2	2.2
74-97-5	Bromochloromethane	<2.2	2.2
75-27-4	Bromodichloromethane	<2.2	2.2
75-25-2	Bromoform	<2.2	2.2
74-83-9	Bromomethane	<2.2	2.2
104-51-8	n-Butylbenzene	<2.2	2.2
135-98-8	sec-Butylbenzene	<2.2	2.2
98-06-6	tert-Butylbenzene	<2.2	2.2
75-15-0	Carbon Disulfide	<11	11
56-23-5	Carbon Tetrachloride	<2.2	2.2
108-90-7	Chlorobenzene	<2.2	2.2
75-00-3	Chloroethane	<2.2	2.2
110-75-8	2-Chloroethyl Vinyl Ether	<11	11
67-66-3	Chloroform	<2.2	2.2
544-10-5	1-Chlorohexane	<2.2	2.2
74-87-3	Chloromethane	<2.2	2.2
95-49-8	2-Chlorotoluene	<2.2	2.2
106-43-4	4-Chlorotoluene	<2.2	2.2
110-82-7	Cyclohexane	<11	11
96-12-8	1,2-Dibromo-3-chloropropane	<11	11
124-48-1	Dibromochloromethane	<2.2	2.2
106-93-4	1,2-Dibromoethane	<2.2	2.2
74-95-3	Dibromomethane	<2.2	2.2
110-57-6	trans-1,4-Dichloro-2-butene	<11	11
95-50-1	1,2-Dichlorobenzene	<2.2	2.2
541-73-1	1,3-Dichlorobenzene	<2.2	2.2
106-46-7	1,4-Dichlorobenzene	<2.2	2.2

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	40	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<2.2	2.2
75-34-3	1,1-Dichloroethane	<2.2	2.2
107-06-2	1,2-Dichloroethane	<2.2	2.2
75-35-4	1,1-Dichloroethene	<2.2	2.2
156-59-2	cis-1,2-Dichloroethene	<2.2	2.2
156-60-5	trans-1,2-Dichloroethene	<2.2	2.2
75-43-4	Dichlorofluoromethane	<2.2	2.2
78-87-5	1,2-Dichloropropane	<2.2	2.2
142-28-9	1,3-Dichloropropane	<2.2	2.2
594-20-7	2,2-Dichloropropane	<2.2	2.2
563-58-6	1,1-Dichloropropene	<2.2	2.2
10061-01-5	cis-1,3-Dichloropropene	<2.2	2.2
10061-02-6	trans-1,3-Dichloropropene	<2.2	2.2
100-41-4	Ethylbenzene	**23**	2.2
60-29-7	Ethyl Ether	<2.2	2.2
142-82-5	Heptane	<11	11
87-68-3	Hexachlorobutadiene	<2.2	2.2
67-72-1	Hexachloroethane	<11	11
591-78-6	2-Hexanone	<110	110
74-88-4	Iodomethane	<11	11
67-63-0	Isopropanol	<110	110
98-82-8	Isopropylbenzene	<2.2	2.2
99-87-6	4-Isopropyltoluene	<2.2	2.2
79-20-9	Methyl Acetate	<11	11
1634-04-4	Methyl tert-Butyl Ether	<2.2	2.2
108-87-2	Methylcyclohexane	<11	11
75-09-2	Methylene Chloride	<11	11
78-93-3	2-Butanone (MEK)	<110	110
91-57-6	2-Methylnaphthalene	<11	11
108-10-1	4-Methyl-2-pentanone (MIBK)	<110	110
91-20-3	Naphthalene	<11	11

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	40	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	<2.2	2.2
100-42-5	Styrene	<2.2	2.2
630-20-6	1,1,1,2-Tetrachloroethane	<2.2	2.2
79-34-5	1,1,2,2-Tetrachloroethane	<2.2	2.2
127-18-4	Tetrachloroethene	<2.2	2.2
109-99-9	Tetrahydrofuran	<11	11
108-88-3	Toluene	**300**	2.2
87-61-6	1,2,3-Trichlorobenzene	<2.2	2.2
120-82-1	1,2,4-Trichlorobenzene	<2.2	2.2
71-55-6	1,1,1-Trichloroethane	<2.2	2.2
79-00-5	1,1,2-Trichloroethane	<2.2	2.2
79-01-6	Trichloroethene	<2.2	2.2
75-69-4	Trichlorofluoromethane	<2.2	2.2
96-18-4	1,2,3-Trichloropropane	<2.2	2.2
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<2.2	2.2
95-63-6	1,2,4-Trimethylbenzene	**4.7**	2.2
108-67-8	1,3,5-Trimethylbenzene	<2.2	2.2
108-05-4	Vinyl Acetate	<11	11
75-01-4	Vinyl Chloride	<2.2	2.2
1330-20-7	Xylene (Total)	**120**	6.7

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	101	*75-123*
1,2-Dichloroethane-d4	95	*83-116*
Toluene-d8	96	*85-113*
4-Bromofluorobenzene	102	*81-117*

*See Statement of Data Qualifications

5560 Corporate Exchange Court SE • Grand Rapids, MI 49512 • (616) 975-4500 • Fax (616) 942-7463

ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1000	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<19	19
208-96-8	Acenaphthylene	<19	19
98-86-2	Acetophenone	<19	19
62-53-3	Aniline	<37	37
120-12-7	Anthracene	<19	19
1912-24-9	Atrazine	<19	19
100-52-7	Benzaldehyde	<37	37
92-87-5	Benzidine	<750	750
56-55-3	Benzo(a)anthracene	<19	19
50-32-8	Benzo(a)pyrene	<19	19
205-99-2	Benzo(b)fluoranthene	<19	19
207-08-9	Benzo(k)fluoranthene	<19	19
191-24-2	Benzo(g,h,i)perylene	<37	37
65-85-0	Benzoic Acid	<75	75
100-51-6	Benzyl Alcohol	<19	19
92-52-4	1,1'-Biphenyl	<19	19
101-55-3	4-Bromophenyl Phenyl Ether	<19	19
85-68-7	Butyl Benzyl Phthalate	<37	37
105-60-2	Caprolactam	<37	37
86-74-8	Carbazole	<19	19
59-50-7	4-Chloro-3-methylphenol	<19	19
95-51-2	2-Chloroaniline	<19	19
106-47-8	4-Chloroaniline	<37	37
111-91-1	Bis(2-chloroethoxy)methane	<19	19
111-44-4	Bis(2-chloroethyl) Ether	<19	19
108-60-1	Bis(2-chloroisopropyl) Ether	<19	19
91-58-7	2-Chloronaphthalene	<19	19
95-57-8	2-Chlorophenol	<19	19
7005-72-3	4-Chlorophenyl Phenyl Ether	<19	19

Continued on next page

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1000	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	<19	19
53-70-3	Dibenz(a,h)anthracene	<37	37
132-64-9	Dibenzofuran	<19	19
84-74-2	Di-n-butyl Phthalate	<19	19
106-46-7	1,4-Dichlorobenzene	<19	19
95-50-1	1,2-Dichlorobenzene	<19	19
541-73-1	1,3-Dichlorobenzene	<19	19
91-94-1	3,3'-Dichlorobenzidine	<190	190
120-83-2	2,4-Dichlorophenol	<19	19
87-65-0	2,6-Dichlorophenol	<19	19
84-66-2	Diethyl Phthalate	<19	19
105-67-9	2,4-Dimethylphenol	<19	19
131-11-3	Dimethyl Phthalate	<19	19
534-52-1	4,6-Dinitro-2-methylphenol	<75	75
51-28-5	2,4-Dinitrophenol	<75	75
606-20-2	2,6-Dinitrotoluene	<19	19
121-14-2	2,4-Dinitrotoluene	<19	19
117-84-0	Di-n-octyl Phthalate	<19	19
122-66-7	1,2-Diphenylhydrazine	<19	19
117-81-7	Bis(2-ethylhexyl) Phthalate	**400**	37
206-44-0	Fluoranthene	<19	19
86-73-7	Fluorene	<19	19
118-74-1	Hexachlorobenzene	<19	19
87-68-3	Hexachlorobutadiene	<19	19
77-47-4	Hexachlorocyclopentadiene	<19	19
67-72-1	Hexachloroethane	<19	19
193-39-5	Indeno(1,2,3-cd)pyrene	<37	37
78-59-1	Isophorone	<19	19
91-57-6	2-Methylnaphthalene	<19	19
90-12-0	1-Methylnaphthalene	<19	19
106-44-5	4-Methylphenol	<19	19

Continued on next page

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1000	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	<19	19
91-20-3	Naphthalene	<19	19
100-01-6	4-Nitroaniline	<75	75
88-74-4	2-Nitroaniline	<19	19
99-09-2	3-Nitroaniline	<37	37
98-95-3	Nitrobenzene	<19	19
88-75-5	2-Nitrophenol	<19	19
100-02-7	4-Nitrophenol	<37	37
62-75-9	N-Nitroso-dimethylamine	<37	37
86-30-6	N-Nitroso-diphenylamine	<19	19
621-64-7	N-Nitroso-di-n-propylamine	<19	19
87-86-5	Pentachlorophenol	<19	19
85-01-8	Phenanthrene	<19	19
108-95-2	Phenol	<19	19
129-00-0	Pyrene	<19	19
110-86-1	Pyridine	<19	19
95-94-3	1,2,4,5-Tetrachlorobenzene	<560	560
58-90-2	2,3,4,6-Tetrachlorophenol	<37	37
120-82-1	1,2,4-Trichlorobenzene	<19	19
95-95-4	2,4,5-Trichlorophenol	<19	19
88-06-2	2,4,6-Trichlorophenol	<19	19

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	89		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Arsenic	**2.9**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
***Barium**	**24**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**4.7**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**8.4**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**4.7**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Mercury	<0.050	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**0.48**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	<0.10	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-4 10-12**	Sampled:	08/16/07 12:15
Lab Sample ID:	**0708383-02**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**89**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	84		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<1.8	1.8
107-02-8	Acrolein	<0.59	0.59
107-13-1	Acrylonitrile	<0.59	0.59
71-43-2	Benzene	<0.12	0.12
108-86-1	Bromobenzene	<0.12	0.12
74-97-5	Bromochloromethane	<0.12	0.12
75-27-4	Bromodichloromethane	<0.12	0.12
75-25-2	Bromoform	<0.12	0.12
74-83-9	Bromomethane	<0.12	0.12
104-51-8	n-Butylbenzene	<0.12	0.12
135-98-8	sec-Butylbenzene	<0.12	0.12
98-06-6	tert-Butylbenzene	<0.12	0.12
75-15-0	Carbon Disulfide	<0.59	0.59
56-23-5	Carbon Tetrachloride	<0.12	0.12
108-90-7	Chlorobenzene	<0.12	0.12
75-00-3	Chloroethane	<0.12	0.12
110-75-8	2-Chloroethyl Vinyl Ether	<0.59	0.59
67-66-3	Chloroform	<0.12	0.12
544-10-5	1-Chlorohexane	<0.12	0.12
74-87-3	Chloromethane	<0.12	0.12
95-49-8	2-Chlorotoluene	<0.12	0.12
106-43-4	4-Chlorotoluene	<0.12	0.12
110-82-7	Cyclohexane	<0.59	0.59
96-12-8	1,2-Dibromo-3-chloropropane	<0.59	0.59
124-48-1	Dibromochloromethane	<0.12	0.12
106-93-4	1,2-Dibromoethane	<0.12	0.12
74-95-3	Dibromomethane	<0.12	0.12
110-57-6	trans-1,4-Dichloro-2-butene	<0.59	0.59
95-50-1	1,2-Dichlorobenzene	<0.12	0.12
541-73-1	1,3-Dichlorobenzene	<0.12	0.12
106-46-7	1,4-Dichlorobenzene	<0.12	0.12

Continued on next page

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	84		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<0.12	0.12
75-34-3	1,1-Dichloroethane	<0.12	0.12
107-06-2	1,2-Dichloroethane	<0.12	0.12
75-35-4	1,1-Dichloroethene	<0.12	0.12
156-59-2	cis-1,2-Dichloroethene	<0.12	0.12
156-60-5	trans-1,2-Dichloroethene	<0.12	0.12
75-43-4	Dichlorofluoromethane	<0.12	0.12
78-87-5	1,2-Dichloropropane	<0.12	0.12
142-28-9	1,3-Dichloropropane	<0.12	0.12
594-20-7	2,2-Dichloropropane	<0.12	0.12
563-58-6	1,1-Dichloropropene	<0.12	0.12
10061-01-5	cis-1,3-Dichloropropene	<0.12	0.12
10061-02-6	trans-1,3-Dichloropropene	<0.12	0.12
100-41-4	Ethylbenzene	**2.5**	0.12
60-29-7	Ethyl Ether	<0.12	0.12
142-82-5	Heptane	**0.70**	0.59
87-68-3	Hexachlorobutadiene	<0.12	0.12
67-72-1	Hexachloroethane	<0.59	0.59
591-78-6	2-Hexanone	<5.9	5.9
74-88-4	Iodomethane	<0.59	0.59
67-63-0	Isopropanol	<5.9	5.9
98-82-8	Isopropylbenzene	<0.12	0.12
99-87-6	4-Isopropyltoluene	<0.12	0.12
79-20-9	Methyl Acetate	<0.59	0.59
1634-04-4	Methyl tert-Butyl Ether	<0.12	0.12
108-87-2	Methylcyclohexane	**1.0**	0.59
75-09-2	Methylene Chloride	<0.59	0.59
78-93-3	2-Butanone (MEK)	<5.9	5.9
91-57-6	2-Methylnaphthalene	<0.59	0.59
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.9	5.9
91-20-3	Naphthalene	**0.67**	0.59

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*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	84		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	**0.16**	0.12
100-42-5	Styrene	<0.12	0.12
630-20-6	1,1,1,2-Tetrachloroethane	<0.12	0.12
79-34-5	1,1,2,2-Tetrachloroethane	<0.12	0.12
127-18-4	Tetrachloroethene	<0.12	0.12
109-99-9	Tetrahydrofuran	**0.70**	0.59
108-88-3	Toluene	**15**	0.12
87-61-6	1,2,3-Trichlorobenzene	<0.12	0.12
120-82-1	1,2,4-Trichlorobenzene	<0.12	0.12
71-55-6	1,1,1-Trichloroethane	<0.12	0.12
79-00-5	1,1,2-Trichloroethane	<0.12	0.12
79-01-6	Trichloroethene	<0.12	0.12
75-69-4	Trichlorofluoromethane	<0.12	0.12
96-18-4	1,2,3-Trichloropropane	<0.12	0.12
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<0.12	0.12
95-63-6	1,2,4-Trimethylbenzene	**0.69**	0.12
108-67-8	1,3,5-Trimethylbenzene	**0.24**	0.12
108-05-4	Vinyl Acetate	<0.59	0.59
75-01-4	Vinyl Chloride	<0.12	0.12
1330-20-7	Xylene (Total)	**13**	0.36

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	102	*75-123*
1,2-Dichloroethane-d4	95	*83-116*
Toluene-d8	93	*85-113*
4-Bromofluorobenzene	103	*81-117*

*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	20	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	84		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<0.40	0.40
208-96-8	Acenaphthylene	<0.40	0.40
98-86-2	Acetophenone	<0.40	0.40
62-53-3	Aniline	<0.79	0.79
120-12-7	Anthracene	<0.40	0.40
1912-24-9	Atrazine	<0.40	0.40
100-52-7	Benzaldehyde	<0.79	0.79
92-87-5	Benzidine	<16	16
56-55-3	Benzo(a)anthracene	<0.40	0.40
50-32-8	Benzo(a)pyrene	<0.40	0.40
205-99-2	Benzo(b)fluoranthene	<0.40	0.40
207-08-9	Benzo(k)fluoranthene	<0.40	0.40
191-24-2	Benzo(g,h,i)perylene	<0.79	0.79
65-85-0	Benzoic Acid	<1.6	1.6
100-51-6	Benzyl Alcohol	<0.40	0.40
92-52-4	1,1'-Biphenyl	<0.40	0.40
101-55-3	4-Bromophenyl Phenyl Ether	<0.40	0.40
85-68-7	Butyl Benzyl Phthalate	**0.88**	0.79
105-60-2	Caprolactam	<0.79	0.79
86-74-8	Carbazole	<0.40	0.40
59-50-7	4-Chloro-3-methylphenol	<0.40	0.40
95-51-2	2-Chloroaniline	<0.40	0.40
106-47-8	4-Chloroaniline	<0.79	0.79
111-91-1	Bis(2-chloroethoxy)methane	<0.40	0.40
111-44-4	Bis(2-chloroethyl) Ether	<0.40	0.40
108-60-1	Bis(2-chloroisopropyl) Ether	<0.40	0.40
91-58-7	2-Chloronaphthalene	<0.40	0.40
95-57-8	2-Chlorophenol	<0.40	0.40
7005-72-3	4-Chlorophenyl Phenyl Ether	<0.40	0.40

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	20	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	84		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	<0.40	0.40
53-70-3	Dibenz(a,h)anthracene	<0.79	0.79
132-64-9	Dibenzofuran	<0.40	0.40
84-74-2	Di-n-butyl Phthalate	<0.40	0.40
106-46-7	1,4-Dichlorobenzene	<0.40	0.40
95-50-1	1,2-Dichlorobenzene	<0.40	0.40
541-73-1	1,3-Dichlorobenzene	<0.40	0.40
91-94-1	3,3´-Dichlorobenzidine	<4.0	4.0
120-83-2	2,4-Dichlorophenol	<0.40	0.40
87-65-0	2,6-Dichlorophenol	<0.40	0.40
84-66-2	Diethyl Phthalate	<0.40	0.40
105-67-9	2,4-Dimethylphenol	<0.40	0.40
131-11-3	Dimethyl Phthalate	<0.40	0.40
534-52-1	4,6-Dinitro-2-methylphenol	<1.6	1.6
51-28-5	2,4-Dinitrophenol	<1.6	1.6
606-20-2	2,6-Dinitrotoluene	<0.40	0.40
121-14-2	2,4-Dinitrotoluene	<0.40	0.40
117-84-0	Di-n-octyl Phthalate	<0.40	0.40
122-66-7	1,2-Diphenylhydrazine	<0.40	0.40
117-81-7	Bis(2-ethylhexyl) Phthalate	**14**	0.79
206-44-0	Fluoranthene	<0.40	0.40
86-73-7	Fluorene	<0.40	0.40
118-74-1	Hexachlorobenzene	<0.40	0.40
87-68-3	Hexachlorobutadiene	<0.40	0.40
77-47-4	Hexachlorocyclopentadiene	<0.40	0.40
67-72-1	Hexachloroethane	<0.40	0.40
193-39-5	Indeno(1,2,3-cd)pyrene	<0.79	0.79
78-59-1	Isophorone	<0.40	0.40
91-57-6	2-Methylnaphthalene	<0.40	0.40
90-12-0	1-Methylnaphthalene	<0.40	0.40
* 106-44-5	4-Methylphenol	**0.73**	0.40

Continued on next page

*See Statement of Data Qualifications

5560 Corporate Exchange Court SE • Grand Rapids, MI 49512 • (616) 975-4500 • Fax (616) 942-7463

ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	20	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	84		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	**0.54**	0.40
91-20-3	Naphthalene	<0.40	0.40
100-01-6	4-Nitroaniline	<1.6	1.6
88-74-4	2-Nitroaniline	<0.40	0.40
99-09-2	3-Nitroaniline	<0.79	0.79
98-95-3	Nitrobenzene	<0.40	0.40
88-75-5	2-Nitrophenol	<0.40	0.40
100-02-7	4-Nitrophenol	<0.79	0.79
62-75-9	N-Nitroso-dimethylamine	<0.79	0.79
86-30-6	N-Nitroso-diphenylamine	<0.40	0.40
621-64-7	N-Nitroso-di-n-propylamine	<0.40	0.40
87-86-5	Pentachlorophenol	<0.40	0.40
85-01-8	Phenanthrene	<0.40	0.40
108-95-2	Phenol	<0.40	0.40
129-00-0	Pyrene	<0.40	0.40
110-86-1	Pyridine	<0.40	0.40
95-94-3	1,2,4,5-Tetrachlorobenzene	<12	12
58-90-2	2,3,4,6-Tetrachlorophenol	<0.79	0.79
120-82-1	1,2,4-Trichlorobenzene	<0.40	0.40
95-95-4	2,4,5-Trichlorophenol	<0.40	0.40
88-06-2	2,4,6-Trichlorophenol	<0.40	0.40

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	84		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
***Arsenic**	**2.8**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
***Barium**	**36**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**0.20**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**11**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**5.9**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Mercury	<0.050	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**0.33**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	<0.10	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 12-14**	Sampled:	08/16/07 18:05
Lab Sample ID:	**0708383-03**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**84**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	1	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<0.84	0.84
107-02-8	Acrolein	<0.28	0.28
107-13-1	Acrylonitrile	<0.28	0.28
71-43-2	Benzene	<0.056	0.056
108-86-1	Bromobenzene	<0.056	0.056
74-97-5	Bromochloromethane	<0.056	0.056
75-27-4	Bromodichloromethane	<0.056	0.056
75-25-2	Bromoform	<0.056	0.056
74-83-9	Bromomethane	<0.056	0.056
104-51-8	n-Butylbenzene	<0.056	0.056
135-98-8	sec-Butylbenzene	<0.056	0.056
98-06-6	tert-Butylbenzene	<0.056	0.056
75-15-0	Carbon Disulfide	<0.28	0.28
56-23-5	Carbon Tetrachloride	<0.056	0.056
108-90-7	Chlorobenzene	<0.056	0.056
75-00-3	Chloroethane	<0.056	0.056
110-75-8	2-Chloroethyl Vinyl Ether	<0.28	0.28
67-66-3	Chloroform	<0.056	0.056
544-10-5	1-Chlorohexane	<0.056	0.056
74-87-3	Chloromethane	<0.056	0.056
95-49-8	2-Chlorotoluene	<0.056	0.056
106-43-4	4-Chlorotoluene	<0.056	0.056
110-82-7	Cyclohexane	<0.28	0.28
96-12-8	1,2-Dibromo-3-chloropropane	<0.28	0.28
124-48-1	Dibromochloromethane	<0.056	0.056
106-93-4	1,2-Dibromoethane	<0.056	0.056
74-95-3	Dibromomethane	<0.056	0.056
110-57-6	trans-1,4-Dichloro-2-butene	<0.28	0.28
95-50-1	1,2-Dichlorobenzene	<0.056	0.056
541-73-1	1,3-Dichlorobenzene	<0.056	0.056
106-46-7	1,4-Dichlorobenzene	<0.056	0.056

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	1	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<0.056	0.056
75-34-3	1,1-Dichloroethane	<0.056	0.056
107-06-2	1,2-Dichloroethane	<0.056	0.056
75-35-4	1,1-Dichloroethene	<0.056	0.056
156-59-2	cis-1,2-Dichloroethene	<0.056	0.056
156-60-5	trans-1,2-Dichloroethene	<0.056	0.056
75-43-4	Dichlorofluoromethane	<0.056	0.056
78-87-5	1,2-Dichloropropane	<0.056	0.056
142-28-9	1,3-Dichloropropane	<0.056	0.056
594-20-7	2,2-Dichloropropane	<0.056	0.056
563-58-6	1,1-Dichloropropene	<0.056	0.056
10061-01-5	cis-1,3-Dichloropropene	<0.056	0.056
10061-02-6	trans-1,3-Dichloropropene	<0.056	0.056
100-41-4	Ethylbenzene	**0.56**	0.056
60-29-7	Ethyl Ether	<0.056	0.056
142-82-5	Heptane	<0.28	0.28
87-68-3	Hexachlorobutadiene	<0.056	0.056
67-72-1	Hexachloroethane	<0.28	0.28
591-78-6	2-Hexanone	<2.8	2.8
74-88-4	Iodomethane	<0.28	0.28
67-63-0	Isopropanol	<2.8	2.8
98-82-8	Isopropylbenzene	<0.056	0.056
99-87-6	4-Isopropyltoluene	<0.056	0.056
79-20-9	Methyl Acetate	<0.28	0.28
1634-04-4	Methyl tert-Butyl Ether	<0.056	0.056
108-87-2	Methylcyclohexane	<0.28	0.28
75-09-2	Methylene Chloride	<0.28	0.28
78-93-3	2-Butanone (MEK)	<2.8	2.8
91-57-6	2-Methylnaphthalene	<0.28	0.28
108-10-1	4-Methyl-2-pentanone (MIBK)	<2.8	2.8
91-20-3	Naphthalene	<0.28	0.28

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	1	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	<0.056	0.056
100-42-5	Styrene	<0.056	0.056
630-20-6	1,1,1,2-Tetrachloroethane	<0.056	0.056
79-34-5	1,1,2,2-Tetrachloroethane	<0.056	0.056
127-18-4	Tetrachloroethene	<0.056	0.056
109-99-9	Tetrahydrofuran	<0.28	0.28
108-88-3	Toluene	**5.6**	0.056
87-61-6	1,2,3-Trichlorobenzene	<0.056	0.056
120-82-1	1,2,4-Trichlorobenzene	<0.056	0.056
71-55-6	1,1,1-Trichloroethane	<0.056	0.056
79-00-5	1,1,2-Trichloroethane	<0.056	0.056
79-01-6	Trichloroethene	<0.056	0.056
75-69-4	Trichlorofluoromethane	<0.056	0.056
96-18-4	1,2,3-Trichloropropane	<0.056	0.056
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<0.056	0.056
95-63-6	1,2,4-Trimethylbenzene	**0.13**	0.056
108-67-8	1,3,5-Trimethylbenzene	<0.056	0.056
108-05-4	Vinyl Acetate	<0.28	0.28
75-01-4	Vinyl Chloride	<0.056	0.056
1330-20-7	Xylene (Total)	**2.8**	0.17

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	101	*75-123*
1,2-Dichloroethane-d4	94	*83-116*
Toluene-d8	96	*85-113*
4-Bromofluorobenzene	104	*81-117*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<0.037	0.037
208-96-8	Acenaphthylene	<0.037	0.037
98-86-2	Acetophenone	<0.037	0.037
62-53-3	Aniline	<0.074	0.074
120-12-7	Anthracene	<0.037	0.037
1912-24-9	Atrazine	<0.037	0.037
100-52-7	Benzaldehyde	<0.074	0.074
92-87-5	Benzidine	<1.5	1.5
56-55-3	Benzo(a)anthracene	<0.037	0.037
50-32-8	Benzo(a)pyrene	<0.037	0.037
205-99-2	Benzo(b)fluoranthene	<0.037	0.037
207-08-9	Benzo(k)fluoranthene	<0.037	0.037
191-24-2	Benzo(g,h,i)perylene	<0.074	0.074
65-85-0	Benzoic Acid	<0.15	0.15
100-51-6	Benzyl Alcohol	<0.037	0.037
92-52-4	1,1'-Biphenyl	<0.037	0.037
101-55-3	4-Bromophenyl Phenyl Ether	<0.037	0.037
85-68-7	Butyl Benzyl Phthalate	**0.099**	0.074
105-60-2	Caprolactam	<0.074	0.074
86-74-8	Carbazole	<0.037	0.037
59-50-7	4-Chloro-3-methylphenol	<0.037	0.037
95-51-2	2-Chloroaniline	<0.037	0.037
106-47-8	4-Chloroaniline	<0.074	0.074
111-91-1	Bis(2-chloroethoxy)methane	<0.037	0.037
111-44-4	Bis(2-chloroethyl) Ether	<0.037	0.037
108-60-1	Bis(2-chloroisopropyl) Ether	<0.037	0.037
91-58-7	2-Chloronaphthalene	<0.037	0.037
95-57-8	2-Chlorophenol	<0.037	0.037
7005-72-3	4-Chlorophenyl Phenyl Ether	<0.037	0.037

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

	CAS Number	Analyte	Analytical Result	RL
	218-01-9	Chrysene	<0.037	0.037
	53-70-3	Dibenz(a,h)anthracene	<0.074	0.074
	132-64-9	Dibenzofuran	<0.037	0.037
	84-74-2	Di-n-butyl Phthalate	<0.037	0.037
	106-46-7	1,4-Dichlorobenzene	<0.037	0.037
	95-50-1	1,2-Dichlorobenzene	<0.037	0.037
	541-73-1	1,3-Dichlorobenzene	<0.037	0.037
	91-94-1	3,3'-Dichlorobenzidine	<0.37	0.37
	120-83-2	2,4-Dichlorophenol	<0.037	0.037
	87-65-0	2,6-Dichlorophenol	<0.037	0.037
	84-66-2	Diethyl Phthalate	<0.037	0.037
	105-67-9	2,4-Dimethylphenol	<0.037	0.037
	131-11-3	Dimethyl Phthalate	<0.037	0.037
	534-52-1	4,6-Dinitro-2-methylphenol	<0.15	0.15
	51-28-5	2,4-Dinitrophenol	<0.15	0.15
	606-20-2	2,6-Dinitrotoluene	<0.037	0.037
	121-14-2	2,4-Dinitrotoluene	<0.037	0.037
	117-84-0	Di-n-octyl Phthalate	<0.037	0.037
	122-66-7	1,2-Diphenylhydrazine	<0.037	0.037
	117-81-7	Bis(2-ethylhexyl) Phthalate	**1.7**	0.074
	206-44-0	Fluoranthene	<0.037	0.037
	86-73-7	Fluorene	<0.037	0.037
	118-74-1	Hexachlorobenzene	<0.037	0.037
	87-68-3	Hexachlorobutadiene	<0.037	0.037
	77-47-4	Hexachlorocyclopentadiene	<0.037	0.037
	67-72-1	Hexachloroethane	<0.037	0.037
	193-39-5	Indeno(1,2,3-cd)pyrene	<0.074	0.074
	78-59-1	Isophorone	<0.037	0.037
	91-57-6	2-Methylnaphthalene	<0.037	0.037
	90-12-0	1-Methylnaphthalene	<0.037	0.037
*	106-44-5	4-Methylphenol	**0.53**	0.037

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	**0.25**	0.037
91-20-3	Naphthalene	<0.037	0.037
100-01-6	4-Nitroaniline	<0.15	0.15
88-74-4	2-Nitroaniline	<0.037	0.037
99-09-2	3-Nitroaniline	<0.074	0.074
98-95-3	Nitrobenzene	<0.037	0.037
88-75-5	2-Nitrophenol	<0.037	0.037
100-02-7	4-Nitrophenol	<0.074	0.074
62-75-9	N-Nitroso-dimethylamine	<0.074	0.074
86-30-6	N-Nitroso-diphenylamine	<0.037	0.037
621-64-7	N-Nitroso-di-n-propylamine	<0.037	0.037
87-86-5	Pentachlorophenol	<0.037	0.037
85-01-8	Phenanthrene	<0.037	0.037
108-95-2	Phenol	<0.037	0.037
129-00-0	Pyrene	<0.037	0.037
110-86-1	Pyridine	<0.037	0.037
95-94-3	1,2,4,5-Tetrachlorobenzene	<1.1	1.1
58-90-2	2,3,4,6-Tetrachlorophenol	<0.074	0.074
120-82-1	1,2,4-Trichlorobenzene	<0.037	0.037
95-95-4	2,4,5-Trichlorophenol	<0.037	0.037
88-06-2	2,4,6-Trichlorophenol	<0.037	0.037

Surrogates	*% Recovery*	*Control Limits*
2-Fluorophenol	53	*40-105*
Phenol-d6	85	*44-104*
Nitrobenzene-d5	111	*47-118*
2-Fluorobiphenyl	85	*48-119*
2,4,6-Tribromophenol	96	*36-120*
o-Terphenyl	91	*45-130*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	89		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Arsenic	**3.9**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
***Barium**	**36**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**0.075**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**12**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**5.2**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Mercury	<0.050	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**0.50**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	<0.10	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-6 14-16**	Sampled:	08/16/07 18:10
Lab Sample ID:	**0708383-04**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**89**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	10	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	83		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<9.0	9.0
107-02-8	Acrolein	<3.0	3.0
107-13-1	Acrylonitrile	<3.0	3.0
71-43-2	Benzene	<0.60	0.60
108-86-1	Bromobenzene	<0.60	0.60
74-97-5	Bromochloromethane	<0.60	0.60
75-27-4	Bromodichloromethane	<0.60	0.60
75-25-2	Bromoform	<0.60	0.60
74-83-9	Bromomethane	<0.60	0.60
104-51-8	n-Butylbenzene	<0.60	0.60
135-98-8	sec-Butylbenzene	<0.60	0.60
98-06-6	tert-Butylbenzene	<0.60	0.60
75-15-0	Carbon Disulfide	<3.0	3.0
56-23-5	Carbon Tetrachloride	<0.60	0.60
108-90-7	Chlorobenzene	<0.60	0.60
75-00-3	Chloroethane	<0.60	0.60
110-75-8	2-Chloroethyl Vinyl Ether	<3.0	3.0
67-66-3	Chloroform	<0.60	0.60
544-10-5	1-Chlorohexane	<0.60	0.60
74-87-3	Chloromethane	<0.60	0.60
95-49-8	2-Chlorotoluene	<0.60	0.60
106-43-4	4-Chlorotoluene	<0.60	0.60
110-82-7	Cyclohexane	<3.0	3.0
96-12-8	1,2-Dibromo-3-chloropropane	<3.0	3.0
124-48-1	Dibromochloromethane	<0.60	0.60
106-93-4	1,2-Dibromoethane	<0.60	0.60
74-95-3	Dibromomethane	<0.60	0.60
110-57-6	trans-1,4-Dichloro-2-butene	<3.0	3.0
95-50-1	1,2-Dichlorobenzene	<0.60	0.60
541-73-1	1,3-Dichlorobenzene	<0.60	0.60
106-46-7	1,4-Dichlorobenzene	<0.60	0.60

Continued on next page

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	10	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	83		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<0.60	0.60
75-34-3	1,1-Dichloroethane	<0.60	0.60
107-06-2	1,2-Dichloroethane	<0.60	0.60
75-35-4	1,1-Dichloroethene	<0.60	0.60
156-59-2	cis-1,2-Dichloroethene	<0.60	0.60
156-60-5	trans-1,2-Dichloroethene	<0.60	0.60
75-43-4	Dichlorofluoromethane	<0.60	0.60
78-87-5	1,2-Dichloropropane	<0.60	0.60
142-28-9	1,3-Dichloropropane	<0.60	0.60
594-20-7	2,2-Dichloropropane	<0.60	0.60
563-58-6	1,1-Dichloropropene	<0.60	0.60
10061-01-5	cis-1,3-Dichloropropene	<0.60	0.60
10061-02-6	trans-1,3-Dichloropropene	<0.60	0.60
100-41-4	Ethylbenzene	**15**	0.60
60-29-7	Ethyl Ether	<0.60	0.60
142-82-5	Heptane	**3.7**	3.0
87-68-3	Hexachlorobutadiene	<0.60	0.60
67-72-1	Hexachloroethane	<3.0	3.0
591-78-6	2-Hexanone	<30	30
74-88-4	Iodomethane	<3.0	3.0
67-63-0	Isopropanol	<30	30
98-82-8	Isopropylbenzene	**0.97**	0.60
99-87-6	4-Isopropyltoluene	<0.60	0.60
79-20-9	Methyl Acetate	<3.0	3.0
1634-04-4	Methyl tert-Butyl Ether	<0.60	0.60
108-87-2	Methylcyclohexane	**4.8**	3.0
75-09-2	Methylene Chloride	<3.0	3.0
78-93-3	2-Butanone (MEK)	<30	30
91-57-6	2-Methylnaphthalene	<3.0	3.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<30	30
91-20-3	Naphthalene	**7.2**	3.0

Continued on next page

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	10	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	83		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	**1.7**	0.60
100-42-5	Styrene	<0.60	0.60
630-20-6	1,1,1,2-Tetrachloroethane	<0.60	0.60
79-34-5	1,1,2,2-Tetrachloroethane	<0.60	0.60
127-18-4	Tetrachloroethene	<0.60	0.60
109-99-9	Tetrahydrofuran	**3.8**	3.0
108-88-3	Toluene	**59**	0.60
87-61-6	1,2,3-Trichlorobenzene	<0.60	0.60
120-82-1	1,2,4-Trichlorobenzene	<0.60	0.60
71-55-6	1,1,1-Trichloroethane	<0.60	0.60
79-00-5	1,1,2-Trichloroethane	<0.60	0.60
79-01-6	Trichloroethene	<0.60	0.60
75-69-4	Trichlorofluoromethane	<0.60	0.60
96-18-4	1,2,3-Trichloropropane	<0.60	0.60
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<0.60	0.60
95-63-6	1,2,4-Trimethylbenzene	**7.2**	0.60
108-67-8	1,3,5-Trimethylbenzene	**2.3**	0.60
108-05-4	Vinyl Acetate	<3.0	3.0
75-01-4	Vinyl Chloride	<0.60	0.60
1330-20-7	Xylene (Total)	**74**	1.8

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	101	*75-123*
1,2-Dichloroethane-d4	96	*83-116*
Toluene-d8	94	*85-113*
4-Bromofluorobenzene	104	*81-117*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1000	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	83		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<20	20
208-96-8	Acenaphthylene	<20	20
98-86-2	Acetophenone	<20	20
62-53-3	Aniline	<40	40
120-12-7	Anthracene	<20	20
1912-24-9	Atrazine	<20	20
100-52-7	Benzaldehyde	<40	40
92-87-5	Benzidine	<800	800
56-55-3	Benzo(a)anthracene	<20	20
50-32-8	Benzo(a)pyrene	<20	20
205-99-2	Benzo(b)fluoranthene	<20	20
207-08-9	Benzo(k)fluoranthene	<20	20
191-24-2	Benzo(g,h,i)perylene	<40	40
65-85-0	Benzoic Acid	<80	80
100-51-6	Benzyl Alcohol	<20	20
92-52-4	1,1'-Biphenyl	<20	20
101-55-3	4-Bromophenyl Phenyl Ether	<20	20
85-68-7	Butyl Benzyl Phthalate	<40	40
105-60-2	Caprolactam	<40	40
86-74-8	Carbazole	<20	20
59-50-7	4-Chloro-3-methylphenol	<20	20
95-51-2	2-Chloroaniline	<20	20
106-47-8	4-Chloroaniline	<40	40
111-91-1	Bis(2-chloroethoxy)methane	<20	20
111-44-4	Bis(2-chloroethyl) Ether	<20	20
108-60-1	Bis(2-chloroisopropyl) Ether	<20	20
91-58-7	2-Chloronaphthalene	<20	20
95-57-8	2-Chlorophenol	<20	20
7005-72-3	4-Chlorophenyl Phenyl Ether	<20	20

Continued on next page

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1000	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	83		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	<20	20
53-70-3	Dibenz(a,h)anthracene	<40	40
132-64-9	Dibenzofuran	<20	20
84-74-2	Di-n-butyl Phthalate	<20	20
106-46-7	1,4-Dichlorobenzene	<20	20
95-50-1	1,2-Dichlorobenzene	<20	20
541-73-1	1,3-Dichlorobenzene	<20	20
91-94-1	3,3´-Dichlorobenzidine	<200	200
120-83-2	2,4-Dichlorophenol	<20	20
87-65-0	2,6-Dichlorophenol	<20	20
84-66-2	Diethyl Phthalate	<20	20
105-67-9	2,4-Dimethylphenol	<20	20
131-11-3	Dimethyl Phthalate	<20	20
534-52-1	4,6-Dinitro-2-methylphenol	<80	80
51-28-5	2,4-Dinitrophenol	<80	80
606-20-2	2,6-Dinitrotoluene	<20	20
121-14-2	2,4-Dinitrotoluene	<20	20
117-84-0	Di-n-octyl Phthalate	<20	20
122-66-7	1,2-Diphenylhydrazine	<20	20
117-81-7	Bis(2-ethylhexyl) Phthalate	**390**	40
206-44-0	Fluoranthene	<20	20
86-73-7	Fluorene	<20	20
118-74-1	Hexachlorobenzene	<20	20
87-68-3	Hexachlorobutadiene	<20	20
77-47-4	Hexachlorocyclopentadiene	<20	20
67-72-1	Hexachloroethane	<20	20
193-39-5	Indeno(1,2,3-cd)pyrene	<40	40
78-59-1	Isophorone	<20	20
91-57-6	2-Methylnaphthalene	<20	20
90-12-0	1-Methylnaphthalene	<20	20
106-44-5	4-Methylphenol	<20	20

Continued on next page

*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1000	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	83		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	<20	20
91-20-3	Naphthalene	<20	20
100-01-6	4-Nitroaniline	<80	80
88-74-4	2-Nitroaniline	<20	20
99-09-2	3-Nitroaniline	<40	40
98-95-3	Nitrobenzene	<20	20
88-75-5	2-Nitrophenol	<20	20
100-02-7	4-Nitrophenol	<40	40
62-75-9	N-Nitroso-dimethylamine	<40	40
86-30-6	N-Nitroso-diphenylamine	<20	20
621-64-7	N-Nitroso-di-n-propylamine	<20	20
87-86-5	Pentachlorophenol	<20	20
85-01-8	Phenanthrene	<20	20
108-95-2	Phenol	<20	20
129-00-0	Pyrene	<20	20
110-86-1	Pyridine	<20	20
95-94-3	1,2,4,5-Tetrachlorobenzene	<600	600
58-90-2	2,3,4,6-Tetrachlorophenol	<40	40
120-82-1	1,2,4-Trichlorobenzene	<20	20
95-95-4	2,4,5-Trichlorophenol	<20	20
88-06-2	2,4,6-Trichlorophenol	<20	20

*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	83		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Arsenic	**2.1**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
***Barium**	**27**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**0.39**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**9.5**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**3.7**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Mercury	<0.050	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**0.27**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	<0.10	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-9 12-14**	Sampled:	08/16/07 17:20
Lab Sample ID:	**0708383-05**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**83**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	1	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	87		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<0.86	0.86
107-02-8	Acrolein	<0.29	0.29
107-13-1	Acrylonitrile	<0.29	0.29
71-43-2	Benzene	<0.057	0.057
108-86-1	Bromobenzene	<0.057	0.057
74-97-5	Bromochloromethane	<0.057	0.057
75-27-4	Bromodichloromethane	<0.057	0.057
75-25-2	Bromoform	<0.057	0.057
74-83-9	Bromomethane	<0.057	0.057
104-51-8	n-Butylbenzene	<0.057	0.057
135-98-8	sec-Butylbenzene	<0.057	0.057
98-06-6	tert-Butylbenzene	<0.057	0.057
75-15-0	Carbon Disulfide	<0.29	0.29
56-23-5	Carbon Tetrachloride	<0.057	0.057
108-90-7	Chlorobenzene	<0.057	0.057
75-00-3	Chloroethane	<0.057	0.057
110-75-8	2-Chloroethyl Vinyl Ether	<0.29	0.29
67-66-3	Chloroform	<0.057	0.057
544-10-5	1-Chlorohexane	<0.057	0.057
74-87-3	Chloromethane	<0.057	0.057
95-49-8	2-Chlorotoluene	<0.057	0.057
106-43-4	4-Chlorotoluene	<0.057	0.057
110-82-7	Cyclohexane	<0.29	0.29
96-12-8	1,2-Dibromo-3-chloropropane	<0.29	0.29
124-48-1	Dibromochloromethane	<0.057	0.057
106-93-4	1,2-Dibromoethane	<0.057	0.057
74-95-3	Dibromomethane	<0.057	0.057
110-57-6	trans-1,4-Dichloro-2-butene	<0.29	0.29
95-50-1	1,2-Dichlorobenzene	<0.057	0.057
541-73-1	1,3-Dichlorobenzene	<0.057	0.057
106-46-7	1,4-Dichlorobenzene	<0.057	0.057

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*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	1	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	87		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<0.057	0.057
75-34-3	1,1-Dichloroethane	<0.057	0.057
107-06-2	1,2-Dichloroethane	<0.057	0.057
75-35-4	1,1-Dichloroethene	<0.057	0.057
156-59-2	cis-1,2-Dichloroethene	<0.057	0.057
156-60-5	trans-1,2-Dichloroethene	<0.057	0.057
75-43-4	Dichlorofluoromethane	<0.057	0.057
78-87-5	1,2-Dichloropropane	<0.057	0.057
142-28-9	1,3-Dichloropropane	<0.057	0.057
594-20-7	2,2-Dichloropropane	<0.057	0.057
563-58-6	1,1-Dichloropropene	<0.057	0.057
10061-01-5	cis-1,3-Dichloropropene	<0.057	0.057
10061-02-6	trans-1,3-Dichloropropene	<0.057	0.057
100-41-4	Ethylbenzene	<0.057	0.057
60-29-7	Ethyl Ether	<0.057	0.057
142-82-5	Heptane	<0.29	0.29
87-68-3	Hexachlorobutadiene	<0.057	0.057
67-72-1	Hexachloroethane	<0.29	0.29
591-78-6	2-Hexanone	<2.9	2.9
74-88-4	Iodomethane	<0.29	0.29
67-63-0	Isopropanol	<2.9	2.9
98-82-8	Isopropylbenzene	<0.057	0.057
99-87-6	4-Isopropyltoluene	<0.057	0.057
79-20-9	Methyl Acetate	<0.29	0.29
1634-04-4	Methyl tert-Butyl Ether	<0.057	0.057
108-87-2	Methylcyclohexane	<0.29	0.29
75-09-2	Methylene Chloride	<0.29	0.29
78-93-3	2-Butanone (MEK)	<2.9	2.9
91-57-6	2-Methylnaphthalene	<0.29	0.29
108-10-1	4-Methyl-2-pentanone (MIBK)	<2.9	2.9
91-20-3	Naphthalene	<0.29	0.29

Continued on next page

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5560 Corporate Exchange Court SE • Grand Rapids, MI 49512 • (616) 975-4500 • Fax (616) 942-7463

ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	1	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	87		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	<0.057	0.057
100-42-5	Styrene	<0.057	0.057
630-20-6	1,1,1,2-Tetrachloroethane	<0.057	0.057
79-34-5	1,1,2,2-Tetrachloroethane	<0.057	0.057
127-18-4	Tetrachloroethene	<0.057	0.057
109-99-9	Tetrahydrofuran	<0.29	0.29
108-88-3	Toluene	**0.48**	0.057
87-61-6	1,2,3-Trichlorobenzene	<0.057	0.057
120-82-1	1,2,4-Trichlorobenzene	<0.057	0.057
71-55-6	1,1,1-Trichloroethane	<0.057	0.057
79-00-5	1,1,2-Trichloroethane	<0.057	0.057
79-01-6	Trichloroethene	<0.057	0.057
75-69-4	Trichlorofluoromethane	<0.057	0.057
96-18-4	1,2,3-Trichloropropane	<0.057	0.057
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<0.057	0.057
95-63-6	1,2,4-Trimethylbenzene	<0.057	0.057
108-67-8	1,3,5-Trimethylbenzene	<0.057	0.057
108-05-4	Vinyl Acetate	<0.29	0.29
75-01-4	Vinyl Chloride	<0.057	0.057
1330-20-7	Xylene (Total)	<0.17	0.17

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	101	*75-123*
1,2-Dichloroethane-d4	95	*83-116*
Toluene-d8	97	*85-113*
4-Bromofluorobenzene	107	*81-117*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	87		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<0.019	0.019
208-96-8	Acenaphthylene	<0.019	0.019
98-86-2	Acetophenone	<0.019	0.019
62-53-3	Aniline	<0.038	0.038
120-12-7	Anthracene	<0.019	0.019
1912-24-9	Atrazine	<0.019	0.019
100-52-7	Benzaldehyde	<0.038	0.038
92-87-5	Benzidine	<0.76	0.76
56-55-3	Benzo(a)anthracene	<0.019	0.019
50-32-8	Benzo(a)pyrene	<0.019	0.019
205-99-2	Benzo(b)fluoranthene	<0.019	0.019
207-08-9	Benzo(k)fluoranthene	<0.019	0.019
191-24-2	Benzo(g,h,i)perylene	<0.038	0.038
65-85-0	Benzoic Acid	<0.076	0.076
100-51-6	Benzyl Alcohol	<0.019	0.019
92-52-4	1,1'-Biphenyl	<0.019	0.019
101-55-3	4-Bromophenyl Phenyl Ether	<0.019	0.019
85-68-7	Butyl Benzyl Phthalate	<0.038	0.038
105-60-2	Caprolactam	<0.038	0.038
86-74-8	Carbazole	<0.019	0.019
59-50-7	4-Chloro-3-methylphenol	<0.019	0.019
95-51-2	2-Chloroaniline	<0.019	0.019
106-47-8	4-Chloroaniline	<0.038	0.038
111-91-1	Bis(2-chloroethoxy)methane	<0.019	0.019
111-44-4	Bis(2-chloroethyl) Ether	<0.019	0.019
108-60-1	Bis(2-chloroisopropyl) Ether	<0.019	0.019
91-58-7	2-Chloronaphthalene	<0.019	0.019
95-57-8	2-Chlorophenol	<0.019	0.019
7005-72-3	4-Chlorophenyl Phenyl Ether	<0.019	0.019

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	87		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	<0.019	0.019
53-70-3	Dibenz(a,h)anthracene	<0.038	0.038
132-64-9	Dibenzofuran	<0.019	0.019
84-74-2	Di-n-butyl Phthalate	<0.019	0.019
106-46-7	1,4-Dichlorobenzene	<0.019	0.019
95-50-1	1,2-Dichlorobenzene	<0.019	0.019
541-73-1	1,3-Dichlorobenzene	<0.019	0.019
91-94-1	3,3´-Dichlorobenzidine	<0.19	0.19
120-83-2	2,4-Dichlorophenol	<0.019	0.019
87-65-0	2,6-Dichlorophenol	<0.019	0.019
84-66-2	Diethyl Phthalate	<0.019	0.019
105-67-9	2,4-Dimethylphenol	<0.019	0.019
131-11-3	Dimethyl Phthalate	<0.019	0.019
534-52-1	4,6-Dinitro-2-methylphenol	<0.076	0.076
51-28-5	2,4-Dinitrophenol	<0.076	0.076
606-20-2	2,6-Dinitrotoluene	<0.019	0.019
121-14-2	2,4-Dinitrotoluene	<0.019	0.019
117-84-0	Di-n-octyl Phthalate	<0.019	0.019
122-66-7	1,2-Diphenylhydrazine	<0.019	0.019
117-81-7	Bis(2-ethylhexyl) Phthalate	**0.45**	0.038
206-44-0	Fluoranthene	<0.019	0.019
86-73-7	Fluorene	<0.019	0.019
118-74-1	Hexachlorobenzene	<0.019	0.019
87-68-3	Hexachlorobutadiene	<0.019	0.019
77-47-4	Hexachlorocyclopentadiene	<0.019	0.019
67-72-1	Hexachloroethane	<0.019	0.019
193-39-5	Indeno(1,2,3-cd)pyrene	<0.038	0.038
78-59-1	Isophorone	<0.019	0.019
91-57-6	2-Methylnaphthalene	<0.019	0.019
90-12-0	1-Methylnaphthalene	<0.019	0.019
* 106-44-5	4-Methylphenol	**0.42**	0.019

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	1	Date Analyzed:	08/21/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082228
Percent Solids:	87		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	**0.19**	0.019
91-20-3	Naphthalene	<0.019	0.019
100-01-6	4-Nitroaniline	<0.076	0.076
88-74-4	2-Nitroaniline	<0.019	0.019
99-09-2	3-Nitroaniline	<0.038	0.038
98-95-3	Nitrobenzene	<0.019	0.019
88-75-5	2-Nitrophenol	<0.019	0.019
100-02-7	4-Nitrophenol	<0.038	0.038
62-75-9	N-Nitroso-dimethylamine	<0.038	0.038
86-30-6	N-Nitroso-diphenylamine	<0.019	0.019
621-64-7	N-Nitroso-di-n-propylamine	<0.019	0.019
87-86-5	Pentachlorophenol	<0.019	0.019
85-01-8	Phenanthrene	<0.019	0.019
108-95-2	Phenol	<0.019	0.019
129-00-0	Pyrene	<0.019	0.019
110-86-1	Pyridine	<0.019	0.019
95-94-3	1,2,4,5-Tetrachlorobenzene	<0.57	0.57
58-90-2	2,3,4,6-Tetrachlorophenol	<0.038	0.038
120-82-1	1,2,4-Trichlorobenzene	<0.019	0.019
95-95-4	2,4,5-Trichlorophenol	<0.019	0.019
88-06-2	2,4,6-Trichlorophenol	<0.019	0.019

Surrogates	***% Recovery***	***Control Limits***
2-Fluorophenol	45	*40-105*
Phenol-d6	71	*44-104*
Nitrobenzene-d5	117	*47-118*
2-Fluorobiphenyl	96	*48-119*
2,4,6-Tribromophenol	96	*36-120*
o-Terphenyl	97	*45-130*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	87		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Arsenic	**4.4**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Barium	**59**	0.20	mg/kg dry wt.	2	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**0.11**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**12**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**6.7**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Mercury	<0.050	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**0.29**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	<0.10	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-8 12-14**	Sampled:	08/16/07 15:05
Lab Sample ID:	**0708383-06**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**87**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	10	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<8.5	8.5
107-02-8	Acrolein	<2.8	2.8
107-13-1	Acrylonitrile	<2.8	2.8
71-43-2	Benzene	<0.56	0.56
108-86-1	Bromobenzene	<0.56	0.56
74-97-5	Bromochloromethane	<0.56	0.56
75-27-4	Bromodichloromethane	<0.56	0.56
75-25-2	Bromoform	<0.56	0.56
74-83-9	Bromomethane	<0.56	0.56
104-51-8	n-Butylbenzene	<0.56	0.56
135-98-8	sec-Butylbenzene	<0.56	0.56
98-06-6	tert-Butylbenzene	<0.56	0.56
75-15-0	Carbon Disulfide	<2.8	2.8
56-23-5	Carbon Tetrachloride	<0.56	0.56
108-90-7	Chlorobenzene	<0.56	0.56
75-00-3	Chloroethane	<0.56	0.56
110-75-8	2-Chloroethyl Vinyl Ether	<2.8	2.8
67-66-3	Chloroform	<0.56	0.56
544-10-5	1-Chlorohexane	<0.56	0.56
74-87-3	Chloromethane	<0.56	0.56
95-49-8	2-Chlorotoluene	<0.56	0.56
106-43-4	4-Chlorotoluene	<0.56	0.56
110-82-7	Cyclohexane	<2.8	2.8
96-12-8	1,2-Dibromo-3-chloropropane	<2.8	2.8
124-48-1	Dibromochloromethane	<0.56	0.56
106-93-4	1,2-Dibromoethane	<0.56	0.56
74-95-3	Dibromomethane	<0.56	0.56
110-57-6	trans-1,4-Dichloro-2-butene	<2.8	2.8
95-50-1	1,2-Dichlorobenzene	<0.56	0.56
541-73-1	1,3-Dichlorobenzene	<0.56	0.56
106-46-7	1,4-Dichlorobenzene	<0.56	0.56

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	10	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<0.56	0.56
75-34-3	1,1-Dichloroethane	<0.56	0.56
107-06-2	1,2-Dichloroethane	<0.56	0.56
75-35-4	1,1-Dichloroethene	<0.56	0.56
156-59-2	cis-1,2-Dichloroethene	<0.56	0.56
156-60-5	trans-1,2-Dichloroethene	<0.56	0.56
75-43-4	Dichlorofluoromethane	<0.56	0.56
78-87-5	1,2-Dichloropropane	<0.56	0.56
142-28-9	1,3-Dichloropropane	<0.56	0.56
594-20-7	2,2-Dichloropropane	<0.56	0.56
563-58-6	1,1-Dichloropropene	<0.56	0.56
10061-01-5	cis-1,3-Dichloropropene	<0.56	0.56
10061-02-6	trans-1,3-Dichloropropene	<0.56	0.56
100-41-4	Ethylbenzene	**3.4**	0.56
60-29-7	Ethyl Ether	<0.56	0.56
142-82-5	Heptane	<2.8	2.8
87-68-3	Hexachlorobutadiene	<0.56	0.56
67-72-1	Hexachloroethane	<2.8	2.8
591-78-6	2-Hexanone	<28	28
74-88-4	Iodomethane	<2.8	2.8
67-63-0	Isopropanol	<28	28
98-82-8	Isopropylbenzene	<0.56	0.56
99-87-6	4-Isopropyltoluene	<0.56	0.56
79-20-9	Methyl Acetate	<2.8	2.8
1634-04-4	Methyl tert-Butyl Ether	<0.56	0.56
108-87-2	Methylcyclohexane	<2.8	2.8
75-09-2	Methylene Chloride	<2.8	2.8
78-93-3	2-Butanone (MEK)	<28	28
91-57-6	2-Methylnaphthalene	<2.8	2.8
108-10-1	4-Methyl-2-pentanone (MIBK)	<28	28
91-20-3	Naphthalene	<2.8	2.8

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	10	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	89		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	<0.56	0.56
100-42-5	Styrene	<0.56	0.56
630-20-6	1,1,1,2-Tetrachloroethane	<0.56	0.56
79-34-5	1,1,2,2-Tetrachloroethane	<0.56	0.56
127-18-4	Tetrachloroethene	**0.82**	0.56
109-99-9	Tetrahydrofuran	<2.8	2.8
108-88-3	Toluene	**89**	0.56
87-61-6	1,2,3-Trichlorobenzene	<0.56	0.56
120-82-1	1,2,4-Trichlorobenzene	<0.56	0.56
71-55-6	1,1,1-Trichloroethane	<0.56	0.56
79-00-5	1,1,2-Trichloroethane	<0.56	0.56
79-01-6	Trichloroethene	**0.96**	0.56
75-69-4	Trichlorofluoromethane	<0.56	0.56
96-18-4	1,2,3-Trichloropropane	<0.56	0.56
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<0.56	0.56
95-63-6	1,2,4-Trimethylbenzene	<0.56	0.56
108-67-8	1,3,5-Trimethylbenzene	<0.56	0.56
108-05-4	Vinyl Acetate	<2.8	2.8
75-01-4	Vinyl Chloride	<0.56	0.56
1330-20-7	Xylene (Total)	**17**	1.7

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	100	*75-123*
1,2-Dichloroethane-d4	98	*83-116*
Toluene-d8	97	*85-113*
4-Bromofluorobenzene	105	*81-117*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<0.038	0.038
208-96-8	Acenaphthylene	<0.038	0.038
98-86-2	Acetophenone	<0.038	0.038
62-53-3	Aniline	<0.075	0.075
120-12-7	Anthracene	<0.038	0.038
1912-24-9	Atrazine	<0.038	0.038
100-52-7	Benzaldehyde	<0.075	0.075
92-87-5	Benzidine	<1.5	1.5
56-55-3	Benzo(a)anthracene	**0.039**	0.038
50-32-8	Benzo(a)pyrene	<0.038	0.038
205-99-2	Benzo(b)fluoranthene	**0.046**	0.038
207-08-9	Benzo(k)fluoranthene	<0.038	0.038
191-24-2	Benzo(g,h,i)perylene	<0.075	0.075
65-85-0	Benzoic Acid	<0.15	0.15
100-51-6	Benzyl Alcohol	<0.038	0.038
92-52-4	1,1'-Biphenyl	<0.038	0.038
101-55-3	4-Bromophenyl Phenyl Ether	<0.038	0.038
85-68-7	Butyl Benzyl Phthalate	<0.075	0.075
105-60-2	Caprolactam	<0.075	0.075
86-74-8	Carbazole	<0.038	0.038
59-50-7	4-Chloro-3-methylphenol	<0.038	0.038
95-51-2	2-Chloroaniline	<0.038	0.038
106-47-8	4-Chloroaniline	<0.075	0.075
111-91-1	Bis(2-chloroethoxy)methane	<0.038	0.038
111-44-4	Bis(2-chloroethyl) Ether	<0.038	0.038
108-60-1	Bis(2-chloroisopropyl) Ether	<0.038	0.038
91-58-7	2-Chloronaphthalene	<0.038	0.038
95-57-8	2-Chlorophenol	<0.038	0.038
7005-72-3	4-Chlorophenyl Phenyl Ether	<0.038	0.038

Continued on next page

*See Statement of Data Qualifications

5560 Corporate Exchange Court SE • Grand Rapids, MI 49512 • (616) 975-4500 • Fax (616) 942-7463

ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	**0.059**	0.038
53-70-3	Dibenz(a,h)anthracene	<0.075	0.075
132-64-9	Dibenzofuran	<0.038	0.038
84-74-2	Di-n-butyl Phthalate	<0.038	0.038
106-46-7	1,4-Dichlorobenzene	<0.038	0.038
95-50-1	1,2-Dichlorobenzene	<0.038	0.038
541-73-1	1,3-Dichlorobenzene	<0.038	0.038
91-94-1	3,3´-Dichlorobenzidine	<0.38	0.38
120-83-2	2,4-Dichlorophenol	<0.038	0.038
87-65-0	2,6-Dichlorophenol	<0.038	0.038
84-66-2	Diethyl Phthalate	<0.038	0.038
105-67-9	2,4-Dimethylphenol	<0.038	0.038
131-11-3	Dimethyl Phthalate	<0.038	0.038
534-52-1	4,6-Dinitro-2-methylphenol	<0.15	0.15
51-28-5	2,4-Dinitrophenol	<0.15	0.15
606-20-2	2,6-Dinitrotoluene	<0.038	0.038
121-14-2	2,4-Dinitrotoluene	<0.038	0.038
117-84-0	Di-n-octyl Phthalate	<0.038	0.038
122-66-7	1,2-Diphenylhydrazine	<0.038	0.038
117-81-7	Bis(2-ethylhexyl) Phthalate	**1.8**	0.075
206-44-0	Fluoranthene	**0.048**	0.038
86-73-7	Fluorene	<0.038	0.038
118-74-1	Hexachlorobenzene	<0.038	0.038
87-68-3	Hexachlorobutadiene	<0.038	0.038
77-47-4	Hexachlorocyclopentadiene	<0.038	0.038
67-72-1	Hexachloroethane	<0.038	0.038
193-39-5	Indeno(1,2,3-cd)pyrene	<0.075	0.075
78-59-1	Isophorone	<0.038	0.038
91-57-6	2-Methylnaphthalene	<0.038	0.038
90-12-0	1-Methylnaphthalene	<0.038	0.038
106-44-5	4-Methylphenol	<0.038	0.038

Continued on next page

*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	89		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	<0.038	0.038
91-20-3	Naphthalene	**0.24**	0.038
100-01-6	4-Nitroaniline	<0.15	0.15
88-74-4	2-Nitroaniline	<0.038	0.038
99-09-2	3-Nitroaniline	<0.075	0.075
98-95-3	Nitrobenzene	<0.038	0.038
88-75-5	2-Nitrophenol	<0.038	0.038
100-02-7	4-Nitrophenol	<0.075	0.075
62-75-9	N-Nitroso-dimethylamine	<0.075	0.075
86-30-6	N-Nitroso-diphenylamine	<0.038	0.038
621-64-7	N-Nitroso-di-n-propylamine	<0.038	0.038
87-86-5	Pentachlorophenol	<0.038	0.038
85-01-8	Phenanthrene	<0.038	0.038
108-95-2	Phenol	<0.038	0.038
129-00-0	Pyrene	**0.041**	0.038
110-86-1	Pyridine	<0.038	0.038
95-94-3	1,2,4,5-Tetrachlorobenzene	<1.1	1.1
58-90-2	2,3,4,6-Tetrachlorophenol	<0.075	0.075
120-82-1	1,2,4-Trichlorobenzene	<0.038	0.038
95-95-4	2,4,5-Trichlorophenol	<0.038	0.038
88-06-2	2,4,6-Trichlorophenol	<0.038	0.038

Surrogates	***% Recovery***	***Control Limits***
2-Fluorophenol	42	*40-105*
Phenol-d6	89	*44-104*
Nitrobenzene-d5	111	*47-118*
2-Fluorobiphenyl	99	*48-119*
2,4,6-Tribromophenol	72	*36-120*
o-Terphenyl	100	*45-130*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	89		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Arsenic	**15**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Barium	**190**	0.50	mg/kg dry wt.	5	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**0.64**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**13**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**100**	0.50	mg/kg dry wt.	5	USEPA-6020A	08/23/07	DSC	0709662
Mercury	**0.45**	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**1.4**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	**0.14**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 4.5-6.5**	Sampled:	08/17/07 08:00
Lab Sample ID:	**0708383-07**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**89**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	50	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	87		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<43	43
107-02-8	Acrolein	<14	14
107-13-1	Acrylonitrile	<14	14
71-43-2	Benzene	<2.9	2.9
108-86-1	Bromobenzene	<2.9	2.9
74-97-5	Bromochloromethane	<2.9	2.9
75-27-4	Bromodichloromethane	<2.9	2.9
75-25-2	Bromoform	<2.9	2.9
74-83-9	Bromomethane	<2.9	2.9
104-51-8	n-Butylbenzene	<2.9	2.9
135-98-8	sec-Butylbenzene	<2.9	2.9
98-06-6	tert-Butylbenzene	<2.9	2.9
75-15-0	Carbon Disulfide	<14	14
56-23-5	Carbon Tetrachloride	<2.9	2.9
108-90-7	Chlorobenzene	<2.9	2.9
75-00-3	Chloroethane	<2.9	2.9
110-75-8	2-Chloroethyl Vinyl Ether	<14	14
67-66-3	Chloroform	<2.9	2.9
544-10-5	1-Chlorohexane	<2.9	2.9
74-87-3	Chloromethane	<2.9	2.9
95-49-8	2-Chlorotoluene	<2.9	2.9
106-43-4	4-Chlorotoluene	<2.9	2.9
110-82-7	Cyclohexane	<14	14
96-12-8	1,2-Dibromo-3-chloropropane	<14	14
124-48-1	Dibromochloromethane	<2.9	2.9
106-93-4	1,2-Dibromoethane	<2.9	2.9
74-95-3	Dibromomethane	<2.9	2.9
110-57-6	trans-1,4-Dichloro-2-butene	<14	14
95-50-1	1,2-Dichlorobenzene	<2.9	2.9
541-73-1	1,3-Dichlorobenzene	<2.9	2.9
106-46-7	1,4-Dichlorobenzene	<2.9	2.9

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	50	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	87		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<2.9	2.9
75-34-3	1,1-Dichloroethane	<2.9	2.9
107-06-2	1,2-Dichloroethane	<2.9	2.9
75-35-4	1,1-Dichloroethene	<2.9	2.9
156-59-2	cis-1,2-Dichloroethene	<2.9	2.9
156-60-5	trans-1,2-Dichloroethene	<2.9	2.9
75-43-4	Dichlorofluoromethane	<2.9	2.9
78-87-5	1,2-Dichloropropane	<2.9	2.9
142-28-9	1,3-Dichloropropane	<2.9	2.9
594-20-7	2,2-Dichloropropane	<2.9	2.9
563-58-6	1,1-Dichloropropene	<2.9	2.9
10061-01-5	cis-1,3-Dichloropropene	<2.9	2.9
10061-02-6	trans-1,3-Dichloropropene	<2.9	2.9
100-41-4	Ethylbenzene	**26**	2.9
60-29-7	Ethyl Ether	<2.9	2.9
142-82-5	Heptane	<14	14
87-68-3	Hexachlorobutadiene	<2.9	2.9
67-72-1	Hexachloroethane	<14	14
591-78-6	2-Hexanone	<140	140
74-88-4	Iodomethane	<14	14
67-63-0	Isopropanol	<140	140
98-82-8	Isopropylbenzene	<2.9	2.9
99-87-6	4-Isopropyltoluene	<2.9	2.9
79-20-9	Methyl Acetate	<14	14
1634-04-4	Methyl tert-Butyl Ether	<2.9	2.9
108-87-2	Methylcyclohexane	<14	14
75-09-2	Methylene Chloride	<14	14
78-93-3	2-Butanone (MEK)	<140	140
91-57-6	2-Methylnaphthalene	<14	14
108-10-1	4-Methyl-2-pentanone (MIBK)	<140	140
91-20-3	Naphthalene	**16**	14

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	50	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	87		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	<2.9	2.9
100-42-5	Styrene	<2.9	2.9
630-20-6	1,1,1,2-Tetrachloroethane	<2.9	2.9
79-34-5	1,1,2,2-Tetrachloroethane	<2.9	2.9
127-18-4	Tetrachloroethene	<2.9	2.9
109-99-9	Tetrahydrofuran	<14	14
108-88-3	Toluene	**450**	2.9
87-61-6	1,2,3-Trichlorobenzene	<2.9	2.9
120-82-1	1,2,4-Trichlorobenzene	<2.9	2.9
71-55-6	1,1,1-Trichloroethane	<2.9	2.9
79-00-5	1,1,2-Trichloroethane	<2.9	2.9
79-01-6	Trichloroethene	<2.9	2.9
75-69-4	Trichlorofluoromethane	<2.9	2.9
96-18-4	1,2,3-Trichloropropane	<2.9	2.9
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<2.9	2.9
95-63-6	1,2,4-Trimethylbenzene	**14**	2.9
108-67-8	1,3,5-Trimethylbenzene	**4.1**	2.9
108-05-4	Vinyl Acetate	<14	14
75-01-4	Vinyl Chloride	<2.9	2.9
1330-20-7	Xylene (Total)	**120**	8.6

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	101	*75-123*
1,2-Dichloroethane-d4	95	*83-116*
Toluene-d8	97	*85-113*
4-Bromofluorobenzene	103	*81-117*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	200	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	87		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<3.8	3.8
208-96-8	Acenaphthylene	<3.8	3.8
98-86-2	Acetophenone	<3.8	3.8
62-53-3	Aniline	<7.6	7.6
120-12-7	Anthracene	<3.8	3.8
1912-24-9	Atrazine	<3.8	3.8
100-52-7	Benzaldehyde	<7.6	7.6
92-87-5	Benzidine	<150	150
56-55-3	Benzo(a)anthracene	<3.8	3.8
50-32-8	Benzo(a)pyrene	<3.8	3.8
205-99-2	Benzo(b)fluoranthene	<3.8	3.8
207-08-9	Benzo(k)fluoranthene	<3.8	3.8
191-24-2	Benzo(g,h,i)perylene	<7.6	7.6
65-85-0	Benzoic Acid	<15	15
100-51-6	Benzyl Alcohol	<3.8	3.8
92-52-4	1,1'-Biphenyl	<3.8	3.8
101-55-3	4-Bromophenyl Phenyl Ether	<3.8	3.8
85-68-7	Butyl Benzyl Phthalate	**8.4**	7.6
105-60-2	Caprolactam	<7.6	7.6
86-74-8	Carbazole	<3.8	3.8
59-50-7	4-Chloro-3-methylphenol	<3.8	3.8
95-51-2	2-Chloroaniline	<3.8	3.8
106-47-8	4-Chloroaniline	<7.6	7.6
111-91-1	Bis(2-chloroethoxy)methane	<3.8	3.8
111-44-4	Bis(2-chloroethyl) Ether	<3.8	3.8
108-60-1	Bis(2-chloroisopropyl) Ether	<3.8	3.8
91-58-7	2-Chloronaphthalene	<3.8	3.8
95-57-8	2-Chlorophenol	<3.8	3.8
7005-72-3	4-Chlorophenyl Phenyl Ether	<3.8	3.8

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	200	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	87		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	<3.8	3.8
53-70-3	Dibenz(a,h)anthracene	<7.6	7.6
132-64-9	Dibenzofuran	<3.8	3.8
84-74-2	Di-n-butyl Phthalate	<3.8	3.8
106-46-7	1,4-Dichlorobenzene	<3.8	3.8
95-50-1	1,2-Dichlorobenzene	<3.8	3.8
541-73-1	1,3-Dichlorobenzene	<3.8	3.8
91-94-1	3,3'-Dichlorobenzidine	<38	38
120-83-2	2,4-Dichlorophenol	<3.8	3.8
87-65-0	2,6-Dichlorophenol	<3.8	3.8
84-66-2	Diethyl Phthalate	<3.8	3.8
105-67-9	2,4-Dimethylphenol	<3.8	3.8
131-11-3	Dimethyl Phthalate	<3.8	3.8
534-52-1	4,6-Dinitro-2-methylphenol	<15	15
51-28-5	2,4-Dinitrophenol	<15	15
606-20-2	2,6-Dinitrotoluene	<3.8	3.8
121-14-2	2,4-Dinitrotoluene	<3.8	3.8
117-84-0	Di-n-octyl Phthalate	<3.8	3.8
122-66-7	1,2-Diphenylhydrazine	<3.8	3.8
117-81-7	Bis(2-ethylhexyl) Phthalate	**190**	7.6
206-44-0	Fluoranthene	<3.8	3.8
86-73-7	Fluorene	<3.8	3.8
118-74-1	Hexachlorobenzene	<3.8	3.8
87-68-3	Hexachlorobutadiene	<3.8	3.8
77-47-4	Hexachlorocyclopentadiene	<3.8	3.8
67-72-1	Hexachloroethane	<3.8	3.8
193-39-5	Indeno(1,2,3-cd)pyrene	<7.6	7.6
78-59-1	Isophorone	<3.8	3.8
91-57-6	2-Methylnaphthalene	<3.8	3.8
90-12-0	1-Methylnaphthalene	<3.8	3.8
106-44-5	4-Methylphenol	<3.8	3.8

Continued on next page

*See Statement of Data Qualifications

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	200	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	87		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	<3.8	3.8
91-20-3	Naphthalene	**17**	3.8
100-01-6	4-Nitroaniline	<15	15
88-74-4	2-Nitroaniline	<3.8	3.8
99-09-2	3-Nitroaniline	<7.6	7.6
98-95-3	Nitrobenzene	<3.8	3.8
88-75-5	2-Nitrophenol	<3.8	3.8
100-02-7	4-Nitrophenol	<7.6	7.6
62-75-9	N-Nitroso-dimethylamine	<7.6	7.6
86-30-6	N-Nitroso-diphenylamine	<3.8	3.8
621-64-7	N-Nitroso-di-n-propylamine	<3.8	3.8
87-86-5	Pentachlorophenol	<3.8	3.8
85-01-8	Phenanthrene	<3.8	3.8
108-95-2	Phenol	<3.8	3.8
129-00-0	Pyrene	<3.8	3.8
110-86-1	Pyridine	<3.8	3.8
95-94-3	1,2,4,5-Tetrachlorobenzene	<110	110
58-90-2	2,3,4,6-Tetrachlorophenol	<7.6	7.6
120-82-1	1,2,4-Trichlorobenzene	<3.8	3.8
95-95-4	2,4,5-Trichlorophenol	<3.8	3.8
88-06-2	2,4,6-Trichlorophenol	<3.8	3.8

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	87		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Arsenic	**9.3**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Barium	**110**	0.50	mg/kg dry wt.	5	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**4.7**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**19**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**12**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Mercury	<0.050	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**0.59**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	<0.10	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-1 11-13**	Sampled:	08/17/07 09:30
Lab Sample ID:	**0708383-08**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Percent Solids	**87**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	76		

*Volatile Organic Compounds by EPA Method 8260B (High Level)

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<2.0	2.0
107-02-8	Acrolein	<0.66	0.66
107-13-1	Acrylonitrile	<0.66	0.66
71-43-2	Benzene	<0.13	0.13
108-86-1	Bromobenzene	<0.13	0.13
74-97-5	Bromochloromethane	<0.13	0.13
75-27-4	Bromodichloromethane	<0.13	0.13
75-25-2	Bromoform	<0.13	0.13
74-83-9	Bromomethane	<0.13	0.13
104-51-8	n-Butylbenzene	<0.13	0.13
135-98-8	sec-Butylbenzene	<0.13	0.13
98-06-6	tert-Butylbenzene	<0.13	0.13
75-15-0	Carbon Disulfide	<0.66	0.66
56-23-5	Carbon Tetrachloride	<0.13	0.13
108-90-7	Chlorobenzene	<0.13	0.13
75-00-3	Chloroethane	<0.13	0.13
110-75-8	2-Chloroethyl Vinyl Ether	<0.66	0.66
67-66-3	Chloroform	<0.13	0.13
544-10-5	1-Chlorohexane	<0.13	0.13
74-87-3	Chloromethane	<0.13	0.13
95-49-8	2-Chlorotoluene	<0.13	0.13
106-43-4	4-Chlorotoluene	<0.13	0.13
110-82-7	Cyclohexane	<0.66	0.66
96-12-8	1,2-Dibromo-3-chloropropane	<0.66	0.66
124-48-1	Dibromochloromethane	<0.13	0.13
106-93-4	1,2-Dibromoethane	<0.13	0.13
74-95-3	Dibromomethane	<0.13	0.13
110-57-6	trans-1,4-Dichloro-2-butene	<0.66	0.66
95-50-1	1,2-Dichlorobenzene	<0.13	0.13
541-73-1	1,3-Dichlorobenzene	<0.13	0.13
106-46-7	1,4-Dichlorobenzene	<0.13	0.13

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	76		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
75-71-8	Dichlorodifluoromethane	<0.13	0.13
75-34-3	1,1-Dichloroethane	<0.13	0.13
107-06-2	1,2-Dichloroethane	<0.13	0.13
75-35-4	1,1-Dichloroethene	<0.13	0.13
156-59-2	cis-1,2-Dichloroethene	<0.13	0.13
156-60-5	trans-1,2-Dichloroethene	<0.13	0.13
75-43-4	Dichlorofluoromethane	<0.13	0.13
78-87-5	1,2-Dichloropropane	<0.13	0.13
142-28-9	1,3-Dichloropropane	<0.13	0.13
594-20-7	2,2-Dichloropropane	<0.13	0.13
563-58-6	1,1-Dichloropropene	<0.13	0.13
10061-01-5	cis-1,3-Dichloropropene	<0.13	0.13
10061-02-6	trans-1,3-Dichloropropene	<0.13	0.13
100-41-4	Ethylbenzene	**0.66**	0.13
60-29-7	Ethyl Ether	<0.13	0.13
142-82-5	Heptane	<0.66	0.66
87-68-3	Hexachlorobutadiene	<0.13	0.13
67-72-1	Hexachloroethane	<0.66	0.66
591-78-6	2-Hexanone	<6.6	6.6
74-88-4	Iodomethane	<0.66	0.66
67-63-0	Isopropanol	<6.6	6.6
98-82-8	Isopropylbenzene	<0.13	0.13
99-87-6	4-Isopropyltoluene	<0.13	0.13
79-20-9	Methyl Acetate	<0.66	0.66
1634-04-4	Methyl tert-Butyl Ether	<0.13	0.13
108-87-2	Methylcyclohexane	<0.66	0.66
75-09-2	Methylene Chloride	<0.66	0.66
78-93-3	2-Butanone (MEK)	<6.6	6.6
91-57-6	2-Methylnaphthalene	<0.66	0.66
108-10-1	4-Methyl-2-pentanone (MIBK)	<6.6	6.6
91-20-3	Naphthalene	<0.66	0.66

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/22/07 By: JDM
Dilution Factor:	2	Date Analyzed:	08/22/07 By: JDM
QC Batch:	0709692	Analytical Batch:	7082308
Percent Solids:	76		

*Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

CAS Number	Analyte	Analytical Result	RL
103-65-1	n-Propylbenzene	<0.13	0.13
100-42-5	Styrene	<0.13	0.13
630-20-6	1,1,1,2-Tetrachloroethane	<0.13	0.13
79-34-5	1,1,2,2-Tetrachloroethane	<0.13	0.13
127-18-4	Tetrachloroethene	**0.30**	0.13
109-99-9	Tetrahydrofuran	<0.66	0.66
108-88-3	Toluene	**26**	0.13
87-61-6	1,2,3-Trichlorobenzene	<0.13	0.13
120-82-1	1,2,4-Trichlorobenzene	<0.13	0.13
71-55-6	1,1,1-Trichloroethane	<0.13	0.13
79-00-5	1,1,2-Trichloroethane	<0.13	0.13
79-01-6	Trichloroethene	**0.23**	0.13
75-69-4	Trichlorofluoromethane	<0.13	0.13
96-18-4	1,2,3-Trichloropropane	<0.13	0.13
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	<0.13	0.13
95-63-6	1,2,4-Trimethylbenzene	<0.13	0.13
108-67-8	1,3,5-Trimethylbenzene	<0.13	0.13
108-05-4	Vinyl Acetate	<0.66	0.66
75-01-4	Vinyl Chloride	<0.13	0.13
1330-20-7	Xylene (Total)	**2.8**	0.40

Surrogates	***% Recovery***	***Control Limits***
Dibromofluoromethane	99	*75-123*
1,2-Dichloroethane-d4	95	*83-116*
Toluene-d8	98	*85-113*
4-Bromofluorobenzene	105	*81-117*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	76		

*Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	**0.094**	0.044
208-96-8	Acenaphthylene	<0.044	0.044
98-86-2	Acetophenone	<0.044	0.044
62-53-3	Aniline	<0.088	0.088
120-12-7	Anthracene	**0.22**	0.044
1912-24-9	Atrazine	<0.044	0.044
100-52-7	Benzaldehyde	<0.088	0.088
92-87-5	Benzidine	<1.8	1.8
56-55-3	Benzo(a)anthracene	**0.41**	0.044
50-32-8	Benzo(a)pyrene	**0.35**	0.044
205-99-2	Benzo(b)fluoranthene	**0.39**	0.044
207-08-9	Benzo(k)fluoranthene	**0.20**	0.044
191-24-2	Benzo(g,h,i)perylene	**0.19**	0.088
65-85-0	Benzoic Acid	<0.18	0.18
100-51-6	Benzyl Alcohol	**0.054**	0.044
92-52-4	1,1'-Biphenyl	<0.044	0.044
101-55-3	4-Bromophenyl Phenyl Ether	<0.044	0.044
85-68-7	Butyl Benzyl Phthalate	<0.088	0.088
105-60-2	Caprolactam	<0.088	0.088
86-74-8	Carbazole	**0.062**	0.044
59-50-7	4-Chloro-3-methylphenol	<0.044	0.044
95-51-2	2-Chloroaniline	<0.044	0.044
106-47-8	4-Chloroaniline	<0.088	0.088
111-91-1	Bis(2-chloroethoxy)methane	<0.044	0.044
111-44-4	Bis(2-chloroethyl) Ether	<0.044	0.044
108-60-1	Bis(2-chloroisopropyl) Ether	<0.044	0.044
91-58-7	2-Chloronaphthalene	<0.044	0.044
95-57-8	2-Chlorophenol	<0.044	0.044
7005-72-3	4-Chlorophenyl Phenyl Ether	<0.044	0.044

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	76		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
218-01-9	Chrysene	**0.41**	0.044
53-70-3	Dibenz(a,h)anthracene	<0.088	0.088
132-64-9	Dibenzofuran	<0.044	0.044
84-74-2	Di-n-butyl Phthalate	<0.044	0.044
106-46-7	1,4-Dichlorobenzene	<0.044	0.044
95-50-1	1,2-Dichlorobenzene	<0.044	0.044
541-73-1	1,3-Dichlorobenzene	<0.044	0.044
91-94-1	3,3'-Dichlorobenzidine	<0.44	0.44
120-83-2	2,4-Dichlorophenol	<0.044	0.044
87-65-0	2,6-Dichlorophenol	<0.044	0.044
84-66-2	Diethyl Phthalate	<0.044	0.044
105-67-9	2,4-Dimethylphenol	<0.044	0.044
131-11-3	Dimethyl Phthalate	<0.044	0.044
534-52-1	4,6-Dinitro-2-methylphenol	<0.18	0.18
51-28-5	2,4-Dinitrophenol	<0.18	0.18
606-20-2	2,6-Dinitrotoluene	<0.044	0.044
121-14-2	2,4-Dinitrotoluene	<0.044	0.044
117-84-0	Di-n-octyl Phthalate	<0.044	0.044
122-66-7	1,2-Diphenylhydrazine	<0.044	0.044
117-81-7	Bis(2-ethylhexyl) Phthalate	<0.088	0.088
206-44-0	Fluoranthene	**0.87**	0.044
86-73-7	Fluorene	**0.090**	0.044
118-74-1	Hexachlorobenzene	<0.044	0.044
87-68-3	Hexachlorobutadiene	<0.044	0.044
77-47-4	Hexachlorocyclopentadiene	<0.044	0.044
67-72-1	Hexachloroethane	<0.044	0.044
193-39-5	Indeno(1,2,3-cd)pyrene	**0.14**	0.088
78-59-1	Isophorone	<0.044	0.044
91-57-6	2-Methylnaphthalene	<0.044	0.044
90-12-0	1-Methylnaphthalene	<0.044	0.044
106-44-5	4-Methylphenol	<0.044	0.044

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Unit:	mg/kg dry	Prepared:	08/21/07 By: ASC
Dilution Factor:	2	Date Analyzed:	08/22/07 By: DMC
QC Batch:	0709582	Analytical Batch:	7082244
Percent Solids:	76		

*Semivolatile Organic Compounds by EPA Method 8270C (Continued)

CAS Number	Analyte	Analytical Result	RL
95-48-7	2-Methylphenol	<0.044	0.044
91-20-3	Naphthalene	**0.094**	0.044
100-01-6	4-Nitroaniline	<0.18	0.18
88-74-4	2-Nitroaniline	<0.044	0.044
99-09-2	3-Nitroaniline	<0.088	0.088
98-95-3	Nitrobenzene	<0.044	0.044
88-75-5	2-Nitrophenol	<0.044	0.044
100-02-7	4-Nitrophenol	<0.088	0.088
62-75-9	N-Nitroso-dimethylamine	<0.088	0.088
86-30-6	N-Nitroso-diphenylamine	<0.044	0.044
621-64-7	N-Nitroso-di-n-propylamine	<0.044	0.044
87-86-5	Pentachlorophenol	<0.044	0.044
85-01-8	Phenanthrene	**0.97**	0.044
108-95-2	Phenol	<0.044	0.044
129-00-0	Pyrene	**0.96**	0.044
110-86-1	Pyridine	<0.044	0.044
95-94-3	1,2,4,5-Tetrachlorobenzene	<1.3	1.3
58-90-2	2,3,4,6-Tetrachlorophenol	<0.088	0.088
120-82-1	1,2,4-Trichlorobenzene	<0.044	0.044
95-95-4	2,4,5-Trichlorophenol	<0.044	0.044
88-06-2	2,4,6-Trichlorophenol	<0.044	0.044

Surrogates	% Recovery	Control Limits
2-Fluorophenol	53	*40-105*
Phenol-d6	88	*44-104*
Nitrobenzene-d5	107	*47-118*
2-Fluorobiphenyl	92	*48-119*
2,4,6-Tribromophenol	87	*36-120*
o-Terphenyl	94	*45-130*

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00
Percent Solids:	76		

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	By	QC Batch
Arsenic	**19**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Barium	**240**	0.50	mg/kg dry wt.	5	USEPA-6020A	08/23/07	DSC	0709662
Cadmium	**0.70**	0.050	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Chromium	**19**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Lead	**110**	0.50	mg/kg dry wt.	5	USEPA-6020A	08/23/07	DSC	0709662
Mercury	**0.25**	0.050	mg/kg dry wt.	1	USEPA-7471A	08/23/07	DSC	0709657
Selenium	**1.2**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662
Silver	**0.17**	0.10	mg/kg dry wt.	1	USEPA-6020A	08/23/07	DSC	0709662

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ANALYTICAL REPORT

Client:	**RMT, Inc. - Grand Rapids Office**	Work Order:	**0708383**
Project:	L.E. Carpenter	Description:	Laboratory Services
Client Sample ID:	**SB-07-3 9-11**	Sampled:	08/17/07 15:55
Lab Sample ID:	**0708383-09**	Sampled By:	RMT
Matrix:	Soil	Received:	08/20/07 17:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Analyzed	Bv	QC Batch
Percent Solids	**76**	0.1	%	1	USEPA-3550B	08/21/07	KNC	0709616

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QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (High Level)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 0709692 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank Analyzed: 08/22/2007 By: JDM
Unit: mg/kg wet Analytical Batch: 7082308

Acetone	<0.75	0.75
Acrolein	<0.25	0.25
Acrylonitrile	<0.25	0.25
Benzene	<0.050	0.050
Bromobenzene	<0.050	0.050
Bromochloromethane	<0.050	0.050
Bromodichloromethane	<0.050	0.050
Bromoform	<0.050	0.050
Bromomethane	<0.050	0.050
n-Butylbenzene	<0.050	0.050
sec-Butylbenzene	<0.050	0.050
tert-Butylbenzene	<0.050	0.050
Carbon Disulfide	<0.25	0.25
Carbon Tetrachloride	<0.050	0.050
Chlorobenzene	<0.050	0.050
Chloroethane	<0.050	0.050
2-Chloroethyl Vinyl Ether	<0.25	0.25
Chloroform	<0.050	0.050
1-Chlorohexane	<0.050	0.050
Chloromethane	<0.050	0.050
2-Chlorotoluene	<0.050	0.050
4-Chlorotoluene	<0.050	0.050
Cyclohexane	<0.25	0.25
1,2-Dibromo-3-chloropropane	<0.25	0.25
Dibromochloromethane	<0.050	0.050
1,2-Dibromoethane	<0.050	0.050
Dibromomethane	<0.050	0.050
trans-1,4-Dichloro-2-butene	<0.25	0.25
1,2-Dichlorobenzene	<0.050	0.050
1,3-Dichlorobenzene	<0.050	0.050
1,4-Dichlorobenzene	<0.050	0.050
Dichlorodifluoromethane	<0.050	0.050
1,1-Dichloroethane	<0.050	0.050
1,2-Dichloroethane	<0.050	0.050
1,1-Dichloroethene	<0.050	0.050
cis-1,2-Dichloroethene	<0.050	0.050

Continued on next page

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QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 0709692 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank (Continued) Analyzed: 08/22/2007 By: JDM
Unit: mg/kg wet Analytical Batch: 7082308

trans-1,2-Dichloroethene	<0.050	0.050
Dichlorofluoromethane	<0.050	0.050
1,2-Dichloropropane	<0.050	0.050
1,3-Dichloropropane	<0.050	0.050
2,2-Dichloropropane	<0.050	0.050
1,1-Dichloropropene	<0.050	0.050
cis-1,3-Dichloropropene	<0.050	0.050
trans-1,3-Dichloropropene	<0.050	0.050
Ethylbenzene	<0.050	0.050
Ethyl Ether	<0.050	0.050
Heptane	<0.25	0.25
Hexachlorobutadiene	<0.050	0.050
Hexachloroethane	<0.25	0.25
2-Hexanone	<2.5	2.5
Iodomethane	<0.25	0.25
Isopropanol	<2.5	2.5
Isopropylbenzene	<0.050	0.050
4-Isopropyltoluene	<0.050	0.050
Methyl Acetate	<0.25	0.25
Methyl tert-Butyl Ether	<0.050	0.050
Methylcyclohexane	<0.25	0.25
Methylene Chloride	<0.25	0.25
2-Butanone (MEK)	<2.5	2.5
2-Methylnaphthalene	<0.25	0.25
4-Methyl-2-pentanone (MIBK)	<2.5	2.5
Naphthalene	<0.25	0.25
n-Propylbenzene	<0.050	0.050
Styrene	<0.050	0.050
1,1,1,2-Tetrachloroethane	<0.050	0.050
1,1,2,2-Tetrachloroethane	<0.050	0.050
Tetrachloroethene	<0.050	0.050
Tetrahydrofuran	<0.25	0.25
Toluene	<0.050	0.050
1,2,3-Trichlorobenzene	<0.050	0.050
1,2,4-Trichlorobenzene	<0.050	0.050
1,1,1-Trichloroethane	<0.050	0.050

Continued on next page

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QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL	
QC Batch: 0709692 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B									
Method Blank (Continued)						Analyzed:		08/22/2007	By: JDM
Unit: mg/kg wet						Analytical Batch:		7082308	
1,1,2-Trichloroethane			<0.050					0.050	
Trichloroethene			<0.050					0.050	
Trichlorofluoromethane			<0.050					0.050	
1,2,3-Trichloropropane			<0.050					0.050	
1,1,2-Trichloro-1,2,2-trifluoroethane			<0.050					0.050	
1,2,4-Trimethylbenzene			<0.050					0.050	
1,3,5-Trimethylbenzene			<0.050					0.050	
Vinyl Acetate			<0.25					0.25	
Vinyl Chloride			<0.050					0.050	
Xylene (Total)			<0.15					0.15	
Method Blank						Analyzed:		08/22/2007	By: JDM
Unit: ug/L						Analytical Batch:		7082308	
Surrogates									
Dibromofluoromethane				101	*75-123*				
1,2-Dichloroethane-d4				95	*83-116*				
Toluene-d8				97	*85-113*				
4-Bromofluorobenzene				102	*81-117*				
Laboratory Control Sample						Analyzed:		08/22/2007	By: JDM
Unit: mg/kg wet						Analytical Batch:		7082308	
Benzene		2.00	**1.91**	96	85-118			0.050	
Chlorobenzene		2.00	**1.85**	92	86-114			0.050	
1,1-Dichloroethene		2.00	**1.85**	92	80-121			0.050	
Toluene		2.00	**1.90**	95	86-120			0.050	
Trichloroethene		2.00	**1.87**	94	83-125			0.050	
Laboratory Control Sample						Analyzed:		08/22/2007	By: JDM
Unit: ug/L						Analytical Batch:		7082308	
Surrogates									
Dibromofluoromethane				100	*75-123*				
1,2-Dichloroethane-d4				94	*83-116*				
Toluene-d8				100	*85-113*				
4-Bromofluorobenzene				100	*81-117*				
Laboratory Control Sample Duplicate						Analyzed:		08/22/2007	By: JDM
Unit: mg/kg wet						Analytical Batch:		7082308	
Benzene		2.00	**2.04**	102	85-118	7	20	0.050	

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QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (High Level) (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
QC Batch: 0709692 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B								
Laboratory Control Sample Duplicate (Continued)						Analyzed:		08/22/2007 By: JDM
Unit: mg/kg wet						Analytical Batch:		7082308
Chlorobenzene		2.00	**1.96**	98	86-114	6	20	0.050
1,1-Dichloroethene		2.00	**1.98**	99	80-121	7	20	0.050
Toluene		2.00	**2.04**	102	86-120	7	20	0.050
Trichloroethene		2.00	**2.01**	101	83-125	7	20	0.050
Laboratory Control Sample Duplicate						Analyzed:		08/22/2007 By: JDM
Unit: ug/L						Analytical Batch:		7082308
Surrogates								
Dibromofluoromethane				100	*75-123*			
1,2-Dichloroethane-d4				93	*83-116*			
Toluene-d8				101	*85-113*			
4-Bromofluorobenzene				102	*81-117*			

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QUALITY CONTROL REPORT

Semivolatile Organic Compounds by EPA Method 8270C

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 0709582 3550B Sonication Extraction/USEPA-8270C

Method Blank Analyzed: 08/21/2007 By: JMK
Unit: mg/kg wet Analytical Batch: 7082215

Acenaphthene			<0.017					0.017
Acenaphthylene			<0.017					0.017
Acetophenone			<0.017					0.017
Aniline			<0.033					0.033
Anthracene			<0.017					0.017
Atrazine			<0.017					0.017
Benzaldehyde			<0.033					0.033
Benzidine			<0.67					0.67
Benzo(a)anthracene			<0.017					0.017
Benzo(a)pyrene			<0.017					0.017
Benzo(b)fluoranthene			<0.017					0.017
Benzo(k)fluoranthene			<0.017					0.017
Benzo(g,h,i)perylene			<0.033					0.033
Benzoic Acid			<0.067					0.067
Benzyl Alcohol			<0.017					0.017
1,1'-Biphenyl			<0.017					0.017
4-Bromophenyl Phenyl Ether			<0.017					0.017
Butyl Benzyl Phthalate			<0.033					0.033
Caprolactam			<0.033					0.033
Carbazole			<0.017					0.017
4-Chloro-3-methylphenol			<0.017					0.017
2-Chloroaniline			<0.017					0.017
4-Chloroaniline			<0.033					0.033
Bis(2-chloroethoxy)methane			<0.017					0.017
Bis(2-chloroethyl) Ether			<0.017					0.017
Bis(2-chloroisopropyl) Ether			<0.017					0.017
2-Chloronaphthalene			<0.017					0.017
2-Chlorophenol			<0.017					0.017
4-Chlorophenyl Phenyl Ether			<0.017					0.017
Chrysene			<0.017					0.017
Dibenz(a,h)anthracene			<0.033					0.033
Dibenzofuran			<0.017					0.017
Di-n-butyl Phthalate			<0.017					0.017
1,4-Dichlorobenzene			<0.017					0.017
1,2-Dichlorobenzene			<0.017					0.017
1,3-Dichlorobenzene			<0.017					0.017

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QUALITY CONTROL REPORT

Semivolatile Organic Compounds by EPA Method 8270C (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 0709582 (Continued) 3550B Sonication Extraction/USEPA-8270C

Method Blank (Continued) Analyzed: 08/21/2007 By: JMK
Unit: mg/kg wet Analytical Batch: 7082215

3,3´-Dichlorobenzidine	<0.17	0.17
2,4-Dichlorophenol	<0.017	0.017
2,6-Dichlorophenol	<0.017	0.017
Diethyl Phthalate	<0.017	0.017
2,4-Dimethylphenol	<0.017	0.017
Dimethyl Phthalate	<0.017	0.017
4,6-Dinitro-2-methylphenol	<0.067	0.067
2,4-Dinitrophenol	<0.067	0.067
2,6-Dinitrotoluene	<0.017	0.017
2,4-Dinitrotoluene	<0.017	0.017
Di-n-octyl Phthalate	<0.017	0.017
1,2-Diphenylhydrazine	<0.017	0.017
Bis(2-ethylhexyl) Phthalate	<0.033	0.033
Fluoranthene	<0.017	0.017
Fluorene	<0.017	0.017
Hexachlorobenzene	<0.017	0.017
Hexachlorobutadiene	<0.017	0.017
Hexachlorocyclopentadiene	<0.017	0.017
Hexachloroethane	<0.017	0.017
Indeno(1,2,3-cd)pyrene	<0.033	0.033
Isophorone	<0.017	0.017
2-Methylnaphthalene	<0.017	0.017
1-Methylnaphthalene	<0.017	0.017
4-Methylphenol	<0.017	0.017
2-Methylphenol	<0.017	0.017
Naphthalene	<0.017	0.017
4-Nitroaniline	<0.067	0.067
2-Nitroaniline	<0.017	0.017
3-Nitroaniline	<0.033	0.033
Nitrobenzene	<0.017	0.017
2-Nitrophenol	<0.017	0.017
4-Nitrophenol	<0.033	0.033
N-Nitroso-dimethylamine	<0.033	0.033
N-Nitroso-diphenylamine	<0.017	0.017
N-Nitroso-di-n-propylamine	<0.017	0.017
Pentachlorophenol	<0.017	0.017

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QUALITY CONTROL REPORT

Semivolatile Organic Compounds by EPA Method 8270C (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 0709582 (Continued) 3550B Sonication Extraction/USEPA-8270C

Method Blank (Continued)						Analyzed:	08/21/2007	By: JMK
Unit: mg/kg wet						Analytical Batch:	7082215	
Phenanthrene			<0.017				0.017	
Phenol			<0.017				0.017	
Pyrene			<0.017				0.017	
Pyridine			<0.017				0.017	
1,2,4,5-Tetrachlorobenzene			<0.50				0.50	
2,3,4,6-Tetrachlorophenol			<0.033				0.033	
1,2,4-Trichlorobenzene			<0.017				0.017	
2,4,5-Trichlorophenol			<0.017				0.017	
2,4,6-Trichlorophenol			<0.017				0.017	
Surrogates								
2-Fluorophenol				88	*40-105*			
Phenol-d6				90	*44-104*			
Nitrobenzene-d5				92	*47-118*			
2-Fluorobiphenyl				91	*48-119*			
2,4,6-Tribromophenol				79	*36-120*			
o-Terphenyl				101	*45-130*			

Laboratory Control Sample						Analyzed:	08/21/2007	By: JMK
Unit: mg/kg wet						Analytical Batch:	7082215	
Acenaphthene	0.333	**0.322**		97	60-120		0.017	
4-Chloro-3-methylphenol	0.333	**0.323**		97	57-124		0.017	
2-Chlorophenol	0.333	**0.362**		109	62-118		0.017	
1,4-Dichlorobenzene	0.333	**0.318**		95	61-111		0.017	
2,4-Dinitrotoluene	0.333	**0.353**		106	51-128		0.017	
Naphthalene	0.333	**0.315**		94	52-128		0.017	
4-Nitrophenol	0.333	**0.304**		91	36-131		0.033	
N-Nitroso-di-n-propylamine	0.333	**0.327**		98	54-115		0.017	
Pentachlorophenol	0.333	**0.269**		81	19-117		0.017	
Phenol	0.333	**0.341**		102	53-120		0.017	
Pyrene	0.333	**0.351**		105	60-132		0.017	
1,2,4-Trichlorobenzene	0.333	**0.332**		100	57-122		0.017	
Surrogates								
2-Fluorophenol				88	*40-105*			
Phenol-d6				90	*44-104*			
Nitrobenzene-d5				89	*47-118*			
2-Fluorobiphenyl				94	*48-119*			

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QUALITY CONTROL REPORT

Semivolatile Organic Compounds by EPA Method 8270C (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 0709582 (Continued) 3550B Sonication Extraction/USEPA-8270C

Laboratory Control Sample (Continued) Analyzed: 08/21/2007 By: JMK

Unit: mg/kg wet Analytical Batch: 7082215

Surrogates (Continued)								
2,4,6-Tribromophenol				101	*36-120*			
o-Terphenyl				98	*45-130*			

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QUALITY CONTROL REPORT

Total Metals by EPA 6000/7000 Series Methods

QC Type	Sample Conc.	Spike Qty.	Result	Unit	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
Analyte:	**Arsenic**/USEPA-6020A								
QC Batch: 0709662 (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.10	mg/kg dry wt.					0.10
Laboratory Control Sample		20.0	**19.9**	mg/kg dry wt.	100	82-116			0.10
0708383-03 SB-07-6 12-14									
Matrix Spike	2.76	20.0	**20.6**	mg/kg dry wt.	89	65-125			0.10
Matrix Spike Duplicate	2.76	20.0	**20.9**	mg/kg dry wt.	91	65-125	2	20	0.10
Analyte:	**Barium**/USEPA-6020A								
QC Batch: 0709662 (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.10	mg/kg dry wt.					0.10
Laboratory Control Sample		20.0	**20.4**	mg/kg dry wt.	102	86-118			0.10
0708383-03 SB-07-6 12-14									
Matrix Spike	35.8	20.0	**52.4**	mg/kg dry wt.	83	64-134			0.20
Matrix Spike Duplicate	35.8	20.0	**56.0**	mg/kg dry wt.	101	64-134	7	20	0.20
Analyte:	**Cadmium**/USEPA-6020A								
QC Batch: 0709662 (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.050	mg/kg dry wt.					0.050
Laboratory Control Sample		20.0	**20.0**	mg/kg dry wt.	100	83-113			0.050
0708383-03 SB-07-6 12-14									
Matrix Spike	0.195	20.0	**20.7**	mg/kg dry wt.	103	84-119			0.050
Matrix Spike Duplicate	0.195	20.0	**20.8**	mg/kg dry wt.	103	84-119	0.2	20	0.050
Analyte:	**Chromium**/USEPA-6020A								
QC Batch: 0709662 (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.10	mg/kg dry wt.					0.10
Laboratory Control Sample		20.0	**20.5**	mg/kg dry wt.	102	87-118			0.10
0708383-03 SB-07-6 12-14									
Matrix Spike	11.1	20.0	**30.8**	mg/kg dry wt.	98	63-134			0.10
Matrix Spike Duplicate	11.1	20.0	**31.7**	mg/kg dry wt.	103	63-134	3	20	0.10
Analyte:	**Lead**/USEPA-6020A								
QC Batch: 0709662 (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.10	mg/kg dry wt.					0.10

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QUALITY CONTROL REPORT

Total Metals by EPA 6000/7000 Series Methods (Continued)

QC Type	Sample Conc.	Spike Qty.	Result	Unit	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
Analyte:	**Lead**/USEPA-6020A (Continued)								
QC Batch: 0709662 (Continued) (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Laboratory Control Sample		20.0	**19.5**	mg/kg dry wt.	97	82-118			0.10
0708383-03 SB-07-6 12-14									
Matrix Spike	5.88	20.0	**24.5**	mg/kg dry wt.	93	69-129			0.10
Matrix Spike Duplicate	5.88	20.0	**25.5**	mg/kg dry wt.	98	69-129	4	20	0.10
Analyte:	**Mercury**/USEPA-7471A								
QC Batch: 0709657 (7471A Mercury Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.050	mg/kg dry wt.					0.050
Laboratory Control Sample		0.333	**0.329**	mg/kg dry wt.	99	81-122			0.050
0708383-03 SB-07-6 12-14									
Matrix Spike	<0.050	0.333	**0.323**	mg/kg dry wt.	97	72-123			0.050
Matrix Spike Duplicate	<0.050	0.333	**0.318**	mg/kg dry wt.	96	72-123	2	20	0.050
Analyte:	**Selenium**/USEPA-6020A								
QC Batch: 0709662 (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.10	mg/kg dry wt.					0.10
Laboratory Control Sample		20.0	**19.0**	mg/kg dry wt.	95	73-117			0.10
0708383-03 SB-07-6 12-14									
Matrix Spike	0.331	20.0	**17.7**	mg/kg dry wt.	87	58-123			0.10
Matrix Spike Duplicate	0.331	20.0	**18.1**	mg/kg dry wt.	89	58-123	2	20	0.10
Analyte:	**Silver**/USEPA-6020A								
QC Batch: 0709662 (3050B Digestion)							Analyzed: 08/23/2007 By: DSC		
Method Blank			<0.10	mg/kg dry wt.					0.10
Laboratory Control Sample		20.0	**20.2**	mg/kg dry wt.	101	90-112			0.10
0708383-03 SB-07-6 12-14									
Matrix Spike	0.0455	20.0	**19.7**	mg/kg dry wt.	98	76-119			0.10
Matrix Spike Duplicate	0.0455	20.0	**20.3**	mg/kg dry wt.	101	76-119	3	20	0.10

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QUALITY CONTROL REPORT

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

QC Type	Sample Conc.	Spike Qty.	Result	Unit	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
Analyte:	**Percent Solids**/USEPA-3550B								
QC Batch: 0709616 (General Inorganic Prep)								Analyzed: 08/21/2007 By: KNC	
Method Blank			<0.1	%					0.1

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STATEMENT OF DATA QUALIFICATIONS

Volatile Organic Compounds by EPA Method 8260B (High Level)

Qualification: Sample integrity for the parameter was suspect upon receipt; container had headspace. All reported values, including non-detectable results, are considered estimated.

Analysis: USEPA-8260B

Sample/Analyte:
0708383-01 SB-07-4 2-6.5
0708383-02 SB-07-4 10-12
0708383-03 SB-07-6 12-14
0708383-04 SB-07-6 14-16
0708383-05 SB-07-9 12-14
0708383-06 SB-07-8 12-14
0708383-07 SB-07-1 4.5-6.5
0708383-08 SB-07-1 11-13
0708383-09 SB-07-3 9-11

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STATEMENT OF DATA QUALIFICATIONS

Semivolatile Organic Compounds by EPA Method 8270C

Qualification: Sample integrity for the parameter was suspect upon receipt; all results, including non-detects, are considered estimated. Samples were received in plastic bags, which are not EPA-approved sample containers.

Analysis: USEPA-8270C

Sample/Analyte:
0708383-01 SB-07-4 2-6.5
0708383-02 SB-07-4 10-12
0708383-03 SB-07-6 12-14
0708383-04 SB-07-6 14-16
0708383-05 SB-07-9 12-14
0708383-06 SB-07-8 12-14
0708383-07 SB-07-1 4.5-6.5
0708383-08 SB-07-1 11-13
0708383-09 SB-07-3 9-11

Qualification: Surrogate results are unavailable due to positive results in the sample, resulting in a dilution. Surrogate concentrations were diluted below the calibration range.

Analysis: USEPA-8270C

Sample/Analyte:
0708383-02 SB-07-4 10-12
0708383-03 SB-07-6 12-14
0708383-05 SB-07-9 12-14
0708383-08 SB-07-1 11-13

Qualification: 3-Methylphenol cannot be resolved from 4-Methylphenol due to chromatographic limitations. The reported result could be 3-Methylphenol, 4-Methylphenol, or a combination of both isomers.

Analysis: USEPA-8270C

Sample/Analyte:

0708383-01 SB-07-4 2-6.5	4-Methylphenol
0708383-03 SB-07-6 12-14	4-Methylphenol
0708383-04 SB-07-6 14-16	4-Methylphenol
0708383-06 SB-07-8 12-14	4-Methylphenol

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STATEMENT OF DATA QUALIFICATIONS

Total Metals by EPA 6000/7000 Series Methods

Qualification:	This analyte was not present in this sample at a concentration greater than 100 times the MDL, therefore serial dilution is not required.	
Analysis:	USEPA-6020A	
Sample/Analyte:	0708383-03 SB-07-6 12-14	Arsenic
Qualification:	Due to sample matrix-related Internal Standard failure, the sample was reanalyzed at dilution. The RL for this analyte has been elevated.	
Analysis:	USEPA-6020A	
Sample/Analyte:	0708383-01 SB-07-4 2-6.5	Arsenic
	0708383-01 SB-07-4 2-6.5	Barium
	0708383-01 SB-07-4 2-6.5	Chromium
	0708383-01 SB-07-4 2-6.5	Selenium
	0708383-02 SB-07-4 10-12	Barium
	0708383-03 SB-07-6 12-14	Barium
	0708383-04 SB-07-6 14-16	Barium
	0708383-05 SB-07-9 12-14	Barium

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Chain of Custody Record

0705383

(11-1) ✓

SEVERN TRENT **STL** - VOL 5012 FRIDGE

Severn Trent Laboratories, Inc.

STL-4124 (0901)

Client	Project Manager	Date	Chain of Custody Number
RMT Inc.	N. Clevett		357217
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 2**
2025 E Beltline Av Ste 402	616-975-5415 / 616-975-1098		
City / State / Zip Code	**Site Contact**	**Lab Contact**	
Grand Rapids MI 49546	N. Clevett		
Project Name and Location (State)	**Carrier/Waybill Number**		
L.E. Carpenter NJ			
Contract/Purchase Order/Quote No.			
6527.28			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed	Soil	Containers & Preservatives: Unpres	H_2SO_4	HNO_3	HCl	NaOH	ZnAc/NaOH	Analysis: 8260B	8270C	LCRA Metals			Special Instructions/ Conditions of Receipt
SB-07-5 7.5-9	8/16/07	1010				X	X						X	X	X			(ZIP LOCK BAGS)
SB-07-7 4-6		1025				X	X											
SB-07-7 7-9		1033				X	X											
SB-07-7 10-12		1045				X	X											
01 SB-07-4 2-6.5		1055				X	X									01	/	
02 SB-07-4 10-12		1215				X	X									01	/	Metals Results 8/24 Friday
SB-07-6 5-7		1345				X	X											
SB-07-6 9-11		1408				X	X											
03 SB-07-6 12-14		1805				X	X									01	/	
04 SB-07-6 14-16		1810				X	X									01	/	
SB-07-9 2-4		1537				X	X											
05 SB-07-9 12-14		1720				X	X									01	/	

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☒ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	8/20/07	17:00	1. Received By D Nardin	8-20-07	17:00
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Chain of Custody Record

0708383

(11-1) ✓

SEVERN TRENT **STL** - VOL. SOIL FRIDGE

Severn Trent Laboratories, Inc.

STL-4124 (0901)

Client	Project Manager	Date	Chain of Custody Number
RMT Inc	N. Cleveth		357215
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page** 2 of 2
2025 E. Beltline Ave Ste 402	616-975-5415 / 616-975-1098		
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	**Analysis (Attach list if more space is needed)**
Grand Rapids / MI / 49546	N. Cleveth		
Project Name and Location (State)	**Carrier/Waybill Number**		
L.E Carpenter NJ			
Contract/Purchase Order/Quote No.			
6527.25			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed	Soil	Containers & Preservatives: Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	8260B	8270C	RCRA Metals			Special Instructions/ Conditions of Receipt
SB-07-12 8-10	8/16/07	1405				X	X											(Zip Lock Bags)
SB-07-12 10-12	8/16/07	1455				X	X											
06 (MS) SB-07-B 12-14	8/16/07	1505				X	X								01		1	Metals Results Fri 8/24
07 SB-07-1 4.5-6.5	8/17/07	0800				X	X								01		1	
08 SB-07-1 11-13	8/17/07	0930				X	X								01		1	
30 SB-07-2 9-11	8/17/07	1110				X	X											
30 SB-07-2 11-13	8/17/07	1120				X	X											
9 SB-07-3 9-11	8/17/07	1555				X	X								01		1	
30 SB-07-08 12-13	8/16/07					X	X											

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☒ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

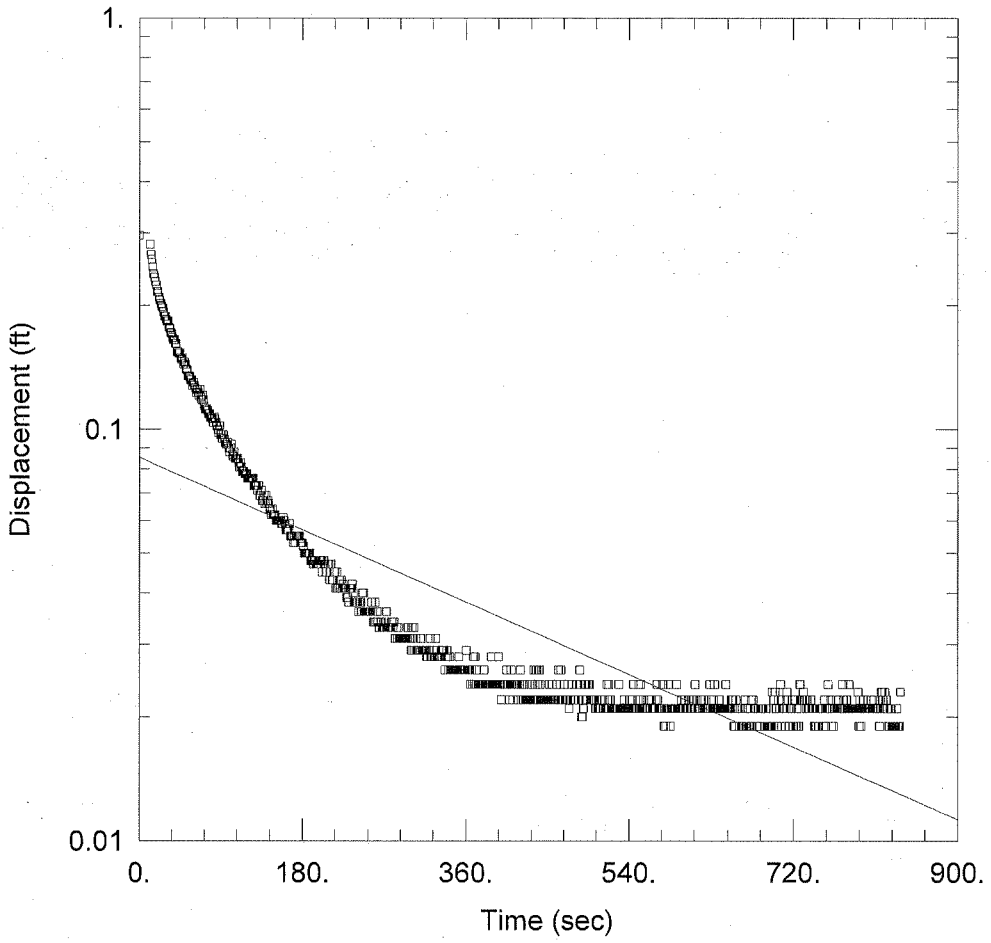
QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	8/20/07	1700	1. Received By D. Skerdin	8-20-07	17:00
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Appendix E
Slug Test Data



SLUG TEST - DROP IN

Data Set: G:\...\MW-19 drop in.20f.aqui.sa.aqt
Date: 08/23/07 Time: 10:43:06

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19
Test Date: 8-15-07

AQUIFER DATA

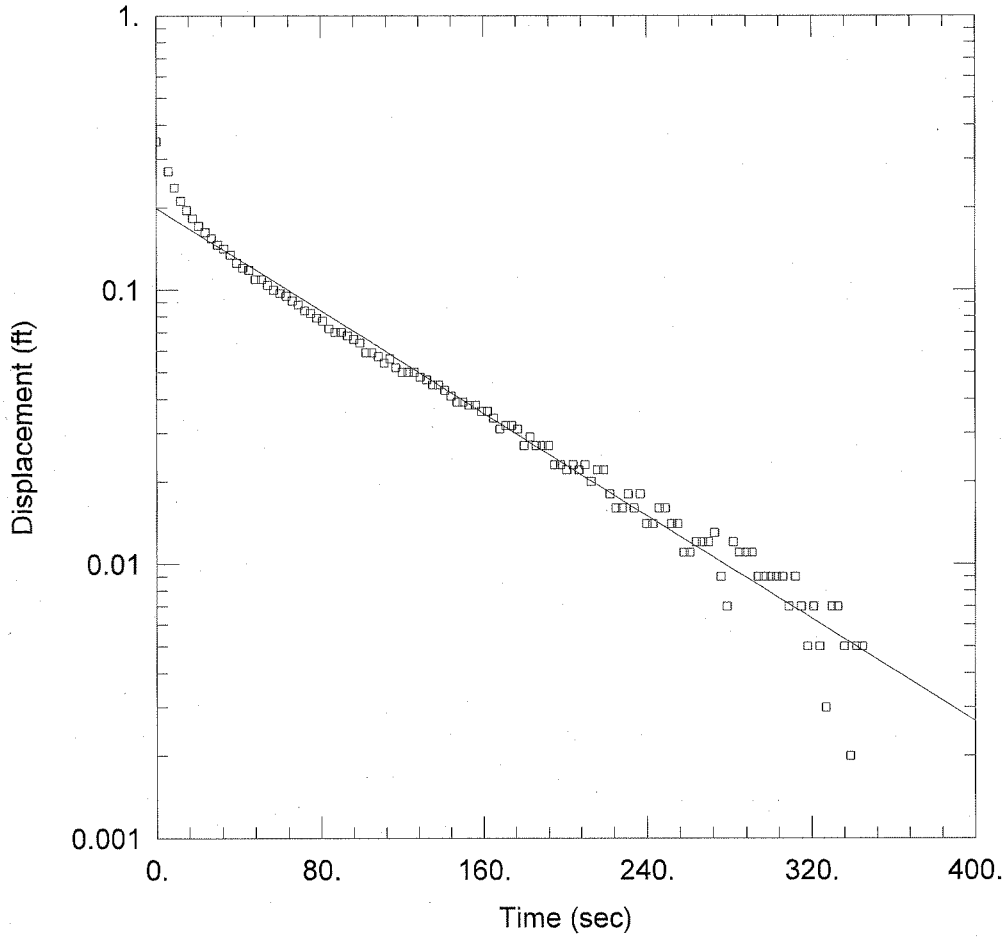
Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-19)

Initial Displacement: 0.296 ft
Total Well Penetration Depth: 8.35 ft
Casing Radius: 0.167 ft
Static Water Column Height: 8.35 ft
Screen Length: 10. ft
Wellbore Radius: 0.3334 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0005042 cm/sec
y0 = 0.0855 ft



SULG TEST - PULL OUT

Data Set: G:\...\MW-19 pull out.20f.aqui.sa.aqt
Date: 08/24/07 Time: 13:05:59

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19
Test Date: 8-15-07

AQUIFER DATA

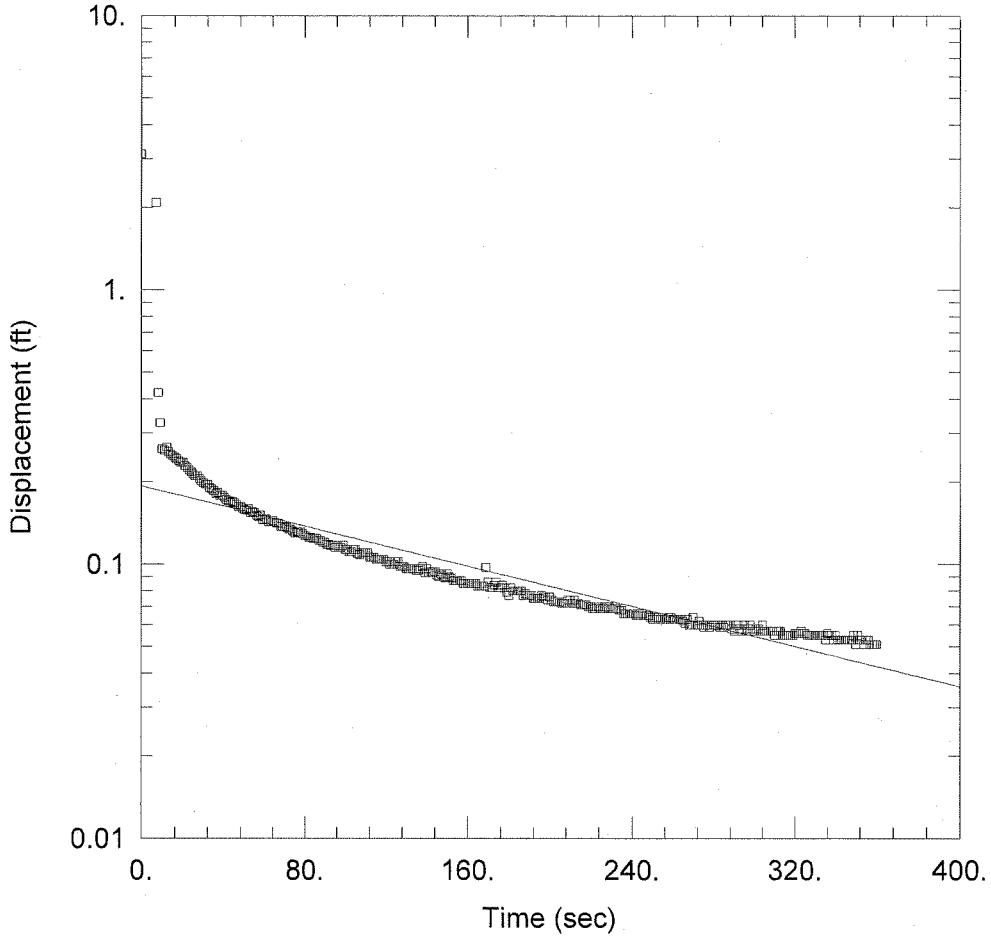
Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (Mw-19)

Initial Displacement: 0.348 ft
Total Well Penetration Depth: 8.35 ft
Casing Radius: 0.167 ft
Static Water Column Height: 8.35 ft
Screen Length: 10. ft
Wellbore Radius: 0.3334 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.002411 cm/sec
y0 = 0.1986 ft



SLUG TEST - DROP IN

Data Set: G:\...\MW-19-5 drop in.20f.aqui.sa.aqt
Date: 08/23/07 Time: 10:32:33

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-5
Test Date: 8-15-07

AQUIFER DATA

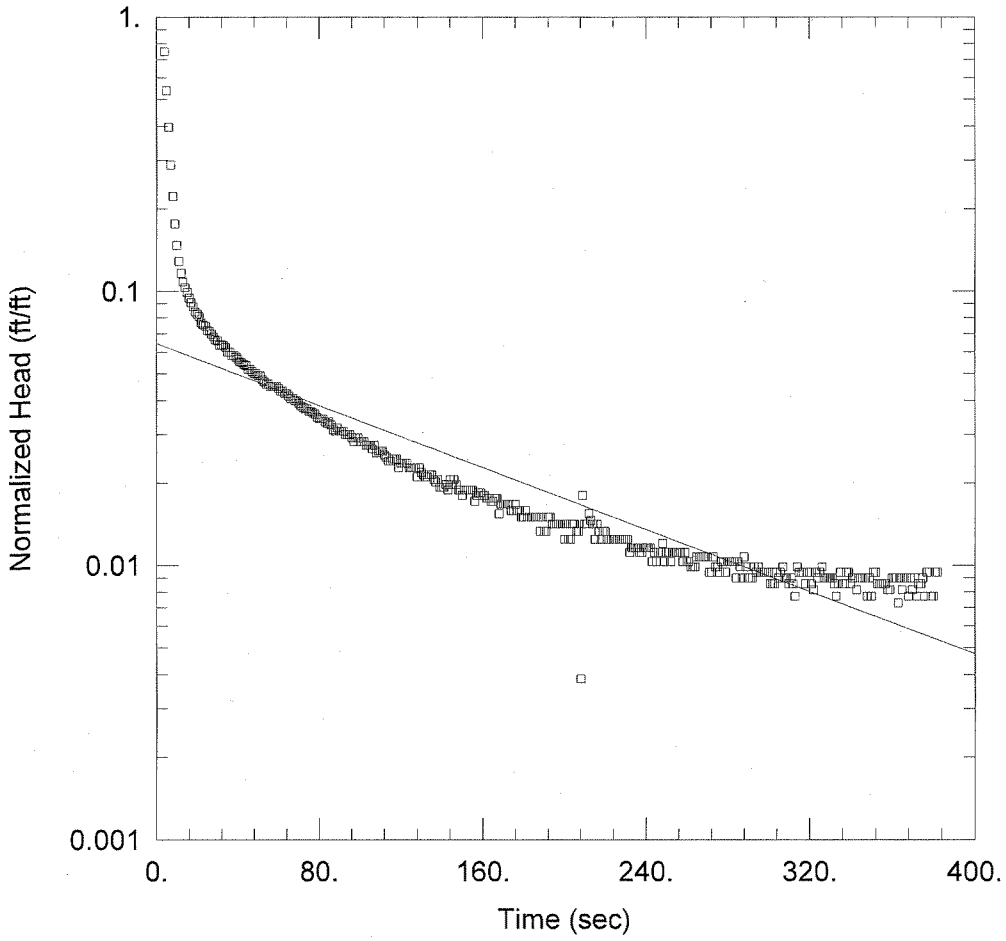
Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-19-5)

Initial Displacement: 3.137 ft
Total Well Penetration Depth: 9.26 ft
Casing Radius: 0.084 ft
Static Water Column Height: 9.26 ft
Screen Length: 10. ft
Wellbore Radius: 0.167 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0002853 cm/sec
y0 = 0.1926 ft



SLUG TEST - PULL OUT

Data Set: G:\...\MW-19-5 pull out.20f.aqui.sa.aqt
Date: 08/27/07 Time: 16:45:19

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-5
Test Date: 8-15-07

AQUIFER DATA

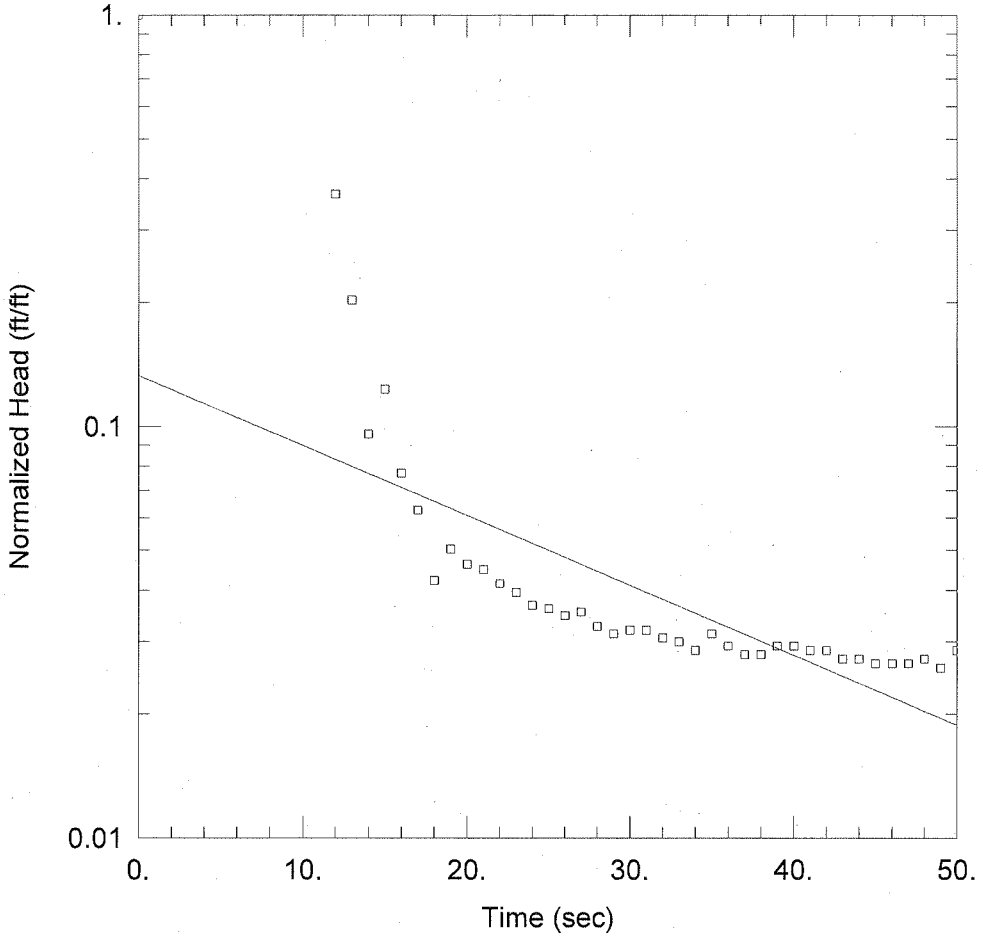
Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-19-5)

Initial Displacement: -2.333 ft
Total Well Penetration Depth: 9.26 ft
Casing Radius: 0.084 ft
Static Water Column Height: 9.26 ft
Screen Length: 10. ft
Wellbore Radius: 0.167 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0004417 cm/sec
y0 = -0.1504 ft



SLUG TEST - DROP IN

Data Set: C:\...\MW-19-6 drop in.20f.aqui.cut40.sa.aqt
Date: 08/29/07 Time: 16:59:20

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-6
Test Date: 8-15-07

AQUIFER DATA

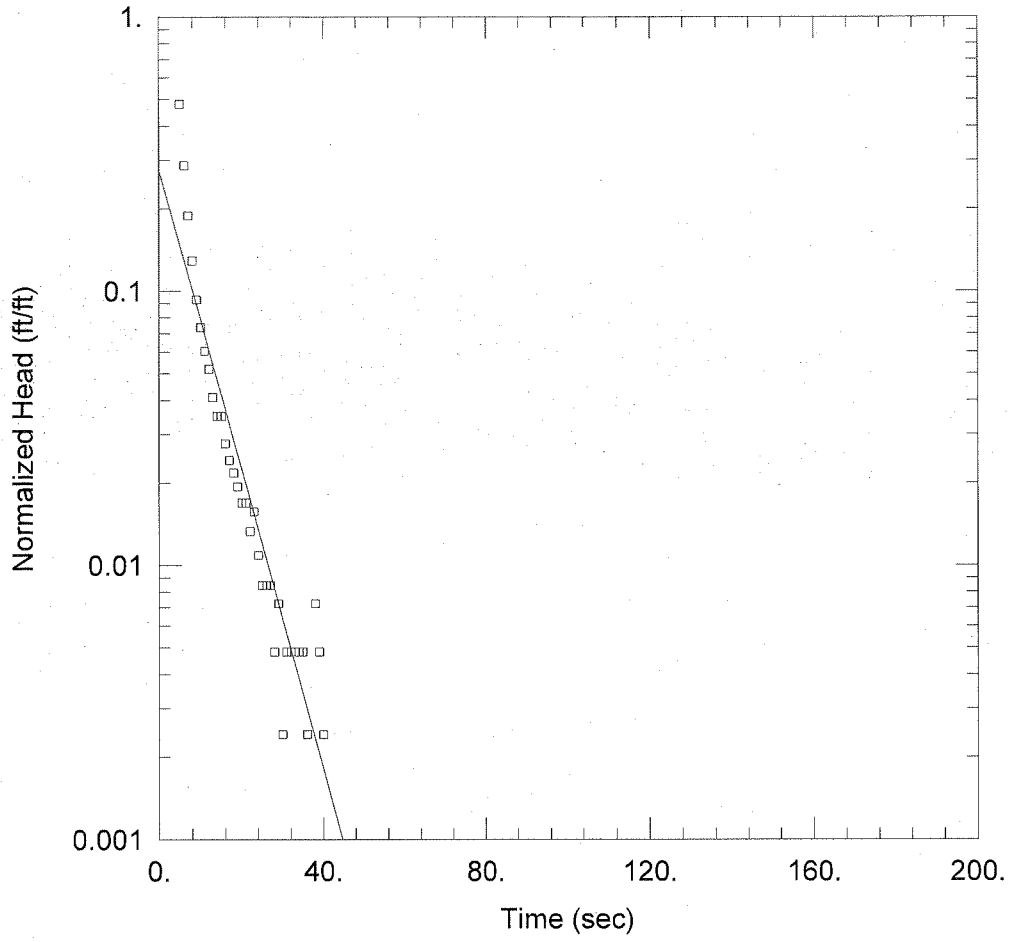
Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-19-6)

Initial Displacement: 1.469 ft
Total Well Penetration Depth: 11.37 ft
Casing Radius: 0.084 ft
Static Water Column Height: 11.37 ft
Screen Length: 10. ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001442 cm/sec
y0 = 0.1954 ft



SLUG TEST - PULL OUT

Data Set: G:\...\MW-19-6 pull out.20f.aqui.sa.aqt
Date: 08/27/07 Time: 17:09:39

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-6
Test Date: 8-15-07

AQUIFER DATA

Saturated Thickness: 20. ft Anisotropy Ratio (Kz/Kr): 0.1

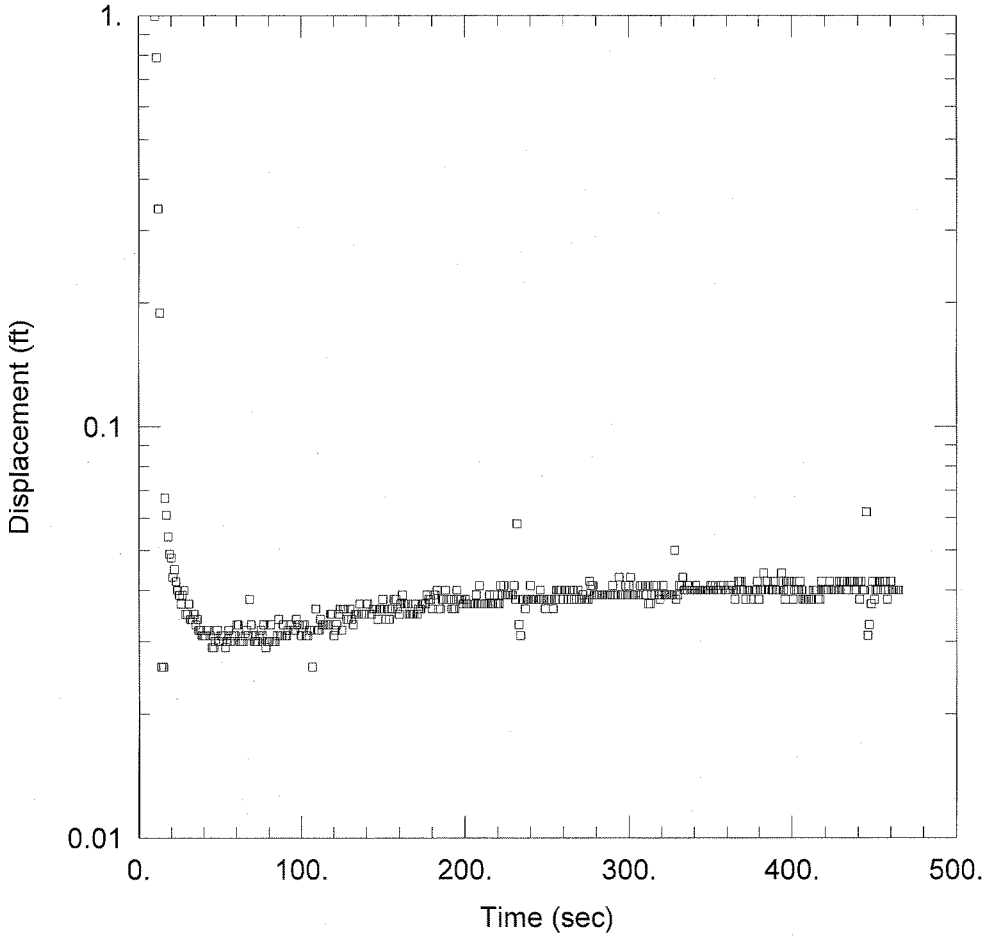
WELL DATA (MW-19-6)

Initial Displacement: -0.829 ft
Total Well Penetration Depth: 11.37 ft
Casing Radius: 0.084 ft
Static Water Column Height: 11.37 ft
Screen Length: 20. ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.001852 cm/sec y0 = -0.2292 ft



SLUG TEST - DROP IN

Data Set: G:\...\MW-19-7 slug in.20f.aqui.sa.aqt
Date: 08/23/07 Time: 10:13:27

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-7
Test Date: 8-15-07

AQUIFER DATA

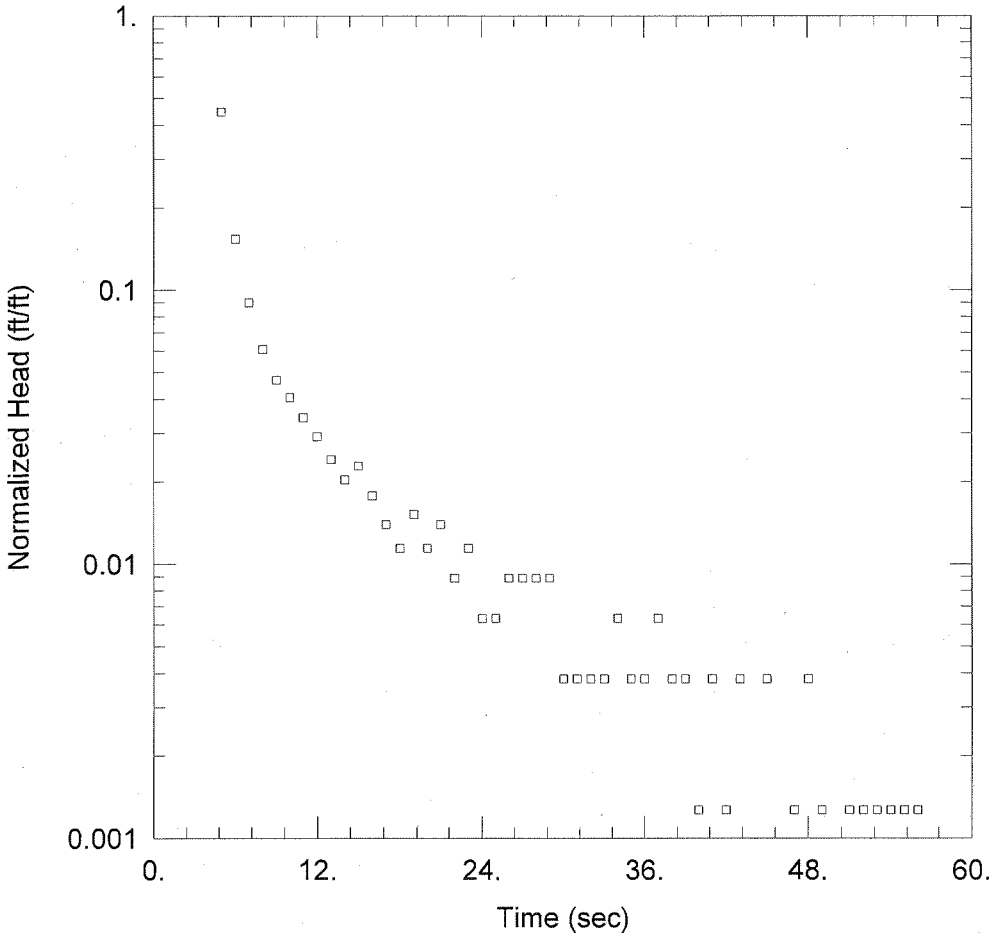
Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-19-7)

Initial Displacement: 1.471 ft
Total Well Penetration Depth: 12.06 ft
Casing Radius: 0.084 ft
Static Water Column Height: 12.06 ft
Screen Length: 10. ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.524 cm/sec
y0 = 1. ft



SLUG TEST - PULL OUT

Data Set: G:\...\MW-19-7 pull out.20f.aqui.sa.aqt
Date: 08/27/07 Time: 17:15:38

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-7
Test Date: 8-15-07

AQUIFER DATA

Saturated Thickness: 20. ft Anisotropy Ratio (Kz/Kr): 0.1

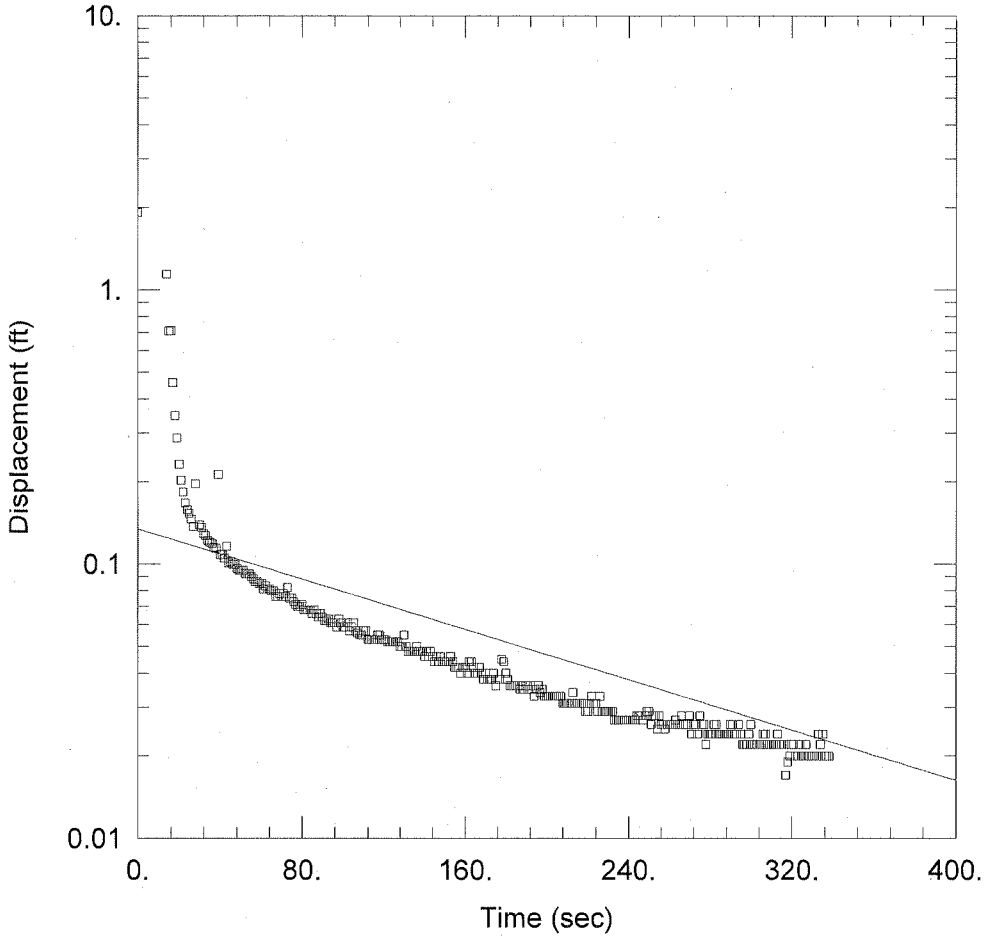
WELL DATA (MW-19-7)

Initial Displacement: -0.789 ft
Total Well Penetration Depth: 12.06 ft
Casing Radius: 0.084 ft
Static Water Column Height: 12.06 ft
Screen Length: 10. ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.524 cm/sec y0 = 1. ft



SLUG TEST - DROP IN

Data Set: G:\...\MW-19-11 drop in.20f.aqui.sa.aqt
Date: 08/23/07 Time: 16:58:48

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-11
Test Date: 8-15-07

AQUIFER DATA

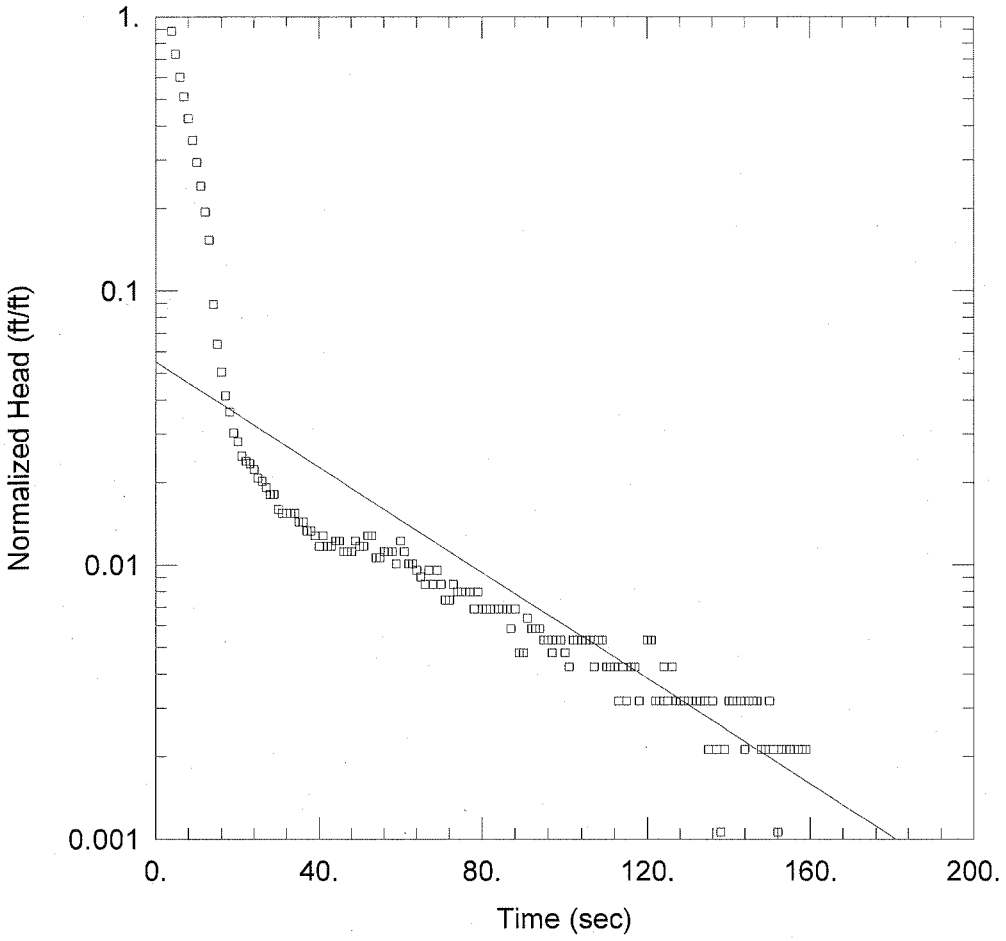
Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-19-11)

Initial Displacement: 1.917 ft
Total Well Penetration Depth: 8.56 ft
Casing Radius: 0.084 ft
Static Water Column Height: 8.56 ft
Screen Length: 10. ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0005476 cm/sec
y0 = 0.1342 ft



SLUG TEST - PULL OUT

Data Set: G:\...\MW-19-11 pull out.20f.aqui.sa.aqt
Date: 08/28/07 Time: 08:35:51

PROJECT INFORMATION

Company: LEC
Client: PolyOne
Project: 6527
Location: MW-19 Hot Spot
Test Well: MW-19-11
Test Date: 8-15-07

AQUIFER DATA

Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-19-11)

Initial Displacement: -1.881 ft
Total Well Penetration Depth: 8.56 ft
Casing Radius: 0.084 ft
Static Water Column Height: 8.56 ft
Screen Length: 10. ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0023 cm/sec
y0 = -0.1036 ft

Appendix F
Chemical Oxidation Information

Redox Tech, LLC
Providing Innovative Soil and Water Solutions

TOTAL OXIDANT DEMAND (TOD) SAMPLE ANALYSES

Company: **RMT, Inc**
Project: **LE Carpenter Site**

DATE TITRATED: August 27, 2007
DATE PREPARED: August 21, 2007

Sample ID	Oxidant	Oxidant demand (g/kg)
SB-07-1 (11'-13')	Sodium Persulfate (20g/kg)	4.7
SB-07-6 (9'-11')	Sodium Persulfate (20g/kg)	2.7

All samples were prepared with distilled water.

TOD is reported in grams of oxidant per kilogram of saturated sediment material.
TOD preparation and treatment procedure for persulfate is completed per Haselow *et al., 2003.* Estimating the Total Oxidant Demand for In Situ Chemical Oxidation Design, Remediation, Autumn, 2003. Post-treatment titrations for persulfate are completed per assay procedures in FMC Persulfates Technical Information bulletin. Persulfate samples were activated with sodium hydroxide dose (pH > 10) at approximately 2 mL 25% NaOH per kg soil.

Bettina Fasolt

200, QUADE DR, NC 27513 TEL 919.678.0140 FAX 919.678.0150
WWW.REDOX-TECH.COM E-MAIL: FASOLT@REDOX-TECH.COM

Estimating the Total Oxidant Demand for *In Situ* Chemical Oxidation Design

John S. Haselow

Robert L. Siegrist

Michelle Crimi

Tim Jarosch

Analytical techniques for designing of in situ *chemical oxidation (ISCO) to treat organics in soil and groundwater are emerging. There are several issues that need to be resolved prior to adopting a standard analytical technique. Some of the more salient issues are discussed. In addition, currently practiced analytical techniques for estimating the oxidant demand for the oxidants permanganate and persulfate are provided. In the absence of analytical measurements, rules of thumb can be used with caution to estimate the overall oxidant demand. © 2003 Wiley Periodicals, Inc.*

INTRODUCTION

In situ chemical oxidation (ISCO) is becoming increasingly popular for remediating organics in soil and groundwater (Vella & Veronda, 1994; Gates et al., 1995; Schnarr et al., 1998; West et al., 1998; Huang et al., 1999; Siegrist et al., 1999; Gates-Anderson et al., 2001; Lowe et al., 2002; Struse et al., 2002). Proper design of a field-scale implementation of ISCO requires data on target contaminant levels as well as quantitative estimates of other oxidant sinks. If all of the reactions that consume oxidant are not properly estimated, the amount of oxidant that needs to be injected will be underestimated, and it is likely that the ISCO effort will fail. Additionally, the demand for the oxidant exerted by subsurface materials may make ISCO economically infeasible for particular sites.

There are a number of chemical and physical factors that contribute to the total oxidant demand (TOD) of a subsurface environment. These include: 1) dissolved phase contaminant, 2) sorbed phase contaminant, 3) free phase contaminant, 4) dissolved phase reduced minerals, 4) solid phase (or sorbed phase) reduced minerals, 5) dissolved and sorbed phase natural organic matter (NOM), and 6) thermal and chemical decomposition. Obviously, the mass of oxidant cannot be reliably estimated from the target contaminant levels alone.

Dissolved phase and sorbed phase contaminant levels can be estimated by widely accepted analytical techniques. Estimating the oxidant required for contaminant treatment is just a simple stoichiometric calculation thereafter. The estimation of free phase contaminants (or dense nonaqueous phase liquids [DNAPL]) is very difficult. In fact, free phase product is seldom seen with chlorinated solvents. Rather, there is often indirect evidence of DNAPL, such as contaminant concentrations above 10 percent of solubility. In addition, sampling techniques may be so disruptive that they inhibit capture of chlorinated solvents.

Besides the target contaminant, other subsurface components will consume oxidant, such as reduced minerals and NOM, as mentioned. The amount of reduced minerals that will deplete oxidant depends on the present oxidation-reduction potential (ORP) of

Published online in Wiley Interscience (www.interscience.wiley.com). DOI: 10.1002/rem.10080

the subsurface environment, as well as the chemical composition of the soil matrix (percentage of iron, for example). Rough estimates of the oxidant demand for reduced minerals can be made based on soil description and semi-qualitative descriptions of the ORP of the aquifer (for example, iron- or sulfate-reducing conditions). However, this type of estimate can easily be in error as much as an order of magnitude and result in under- or over-injection of oxidants. The reduced minerals are typically the largest oxidant sink, but in some instances the NOM demand can be overwhelming. Obviously, not all NOM will consume oxidant (Struse et al., 1999, Siegrist et al., 1999), and the level of NOM oxidation depends on the oxidant. Therefore, a simple analytical measurement such as total organic carbon may not provide an accurate estimate of the oxidant required for NOM. Oxidants may also be consumed through thermal decomposition, such as the conversion of hydrogen peroxide to water and oxygen.

With the exception of thermal or chemical decomposition of the oxidant, all oxidant sinks can be quantitatively estimated using fairly simple analytical techniques.

With the exception of thermal or chemical decomposition of the oxidant, all oxidant sinks can be quantitatively estimated using fairly simple analytical techniques. The tests are currently being conducted by many practitioners in the ISCO field. There is not even a common terminology for the test—some of the more common terms are soil oxidant demand (SOD), natural oxidant demand (NOD), or total oxidant demand (TOD). The term TOD is utilized herein because SOD may not capture the oxidant demand that may occur in the aqueous phase. NOD may imply that all of the oxidant demand is natural, when in fact, significant oxidant demand may result from non-natural reasons. Nonetheless, there is not an accepted terminology and TOD is merely a suggested term that will be used in this article.

There is also not concurrence on methods for completing a TOD test. There are several issues that must be considered. The ISCO science is relatively immature in broad practice. There may eventually be common acceptance. The ultimate goal is for an established procedure that the scientific community will accept. This will facilitate consistent implementation of ISCO. Many of the issues that must be considered are presented here. To our knowledge, this is the first paper on this narrow topic in ISCO. However, the opinions presented herein are merely meant to initiate some technical discussion of the TOD test. The opinions herein may not all be accepted eventually. It is hoped that it will eventually lead to a common and well-accepted standardized analytical technique.

Much of the TOD discussion centers on the use of permanganate as an oxidizing agent. Obviously, there are many other oxidizing agents that are used for soil and groundwater remediation (Siegrist et al., 2001). There is a discussion of TOD testing with sodium persulfate (Hoag et al., 2002) and with hydrogen peroxide (and Fenton's reagent). TOD testing can be an important part of any oxidation program. There may be more oxidants that emerge for remediation, and TOD tests may need to be developed for those oxidants. This article presents methods currently employed for estimated TOD, as well as the issues that must be considered with respect to TOD testing, including: 1) sample size; 2) sample location and number; 3) sample preservation, 4) sample location; 4) DNAPL type, mass, and distribution; 5) contaminant location (i.e., vadose zone, fractured bedrock, etc.); and 6) oxidant concentration.

METHODS FOR ESTIMATING TOD

Simple colorimetric techniques can be used to estimate the TOD of the aquifer or soil material. The colorimetric technique uses varying ratios of oxidant mass to soil mass prepared in separate vials. The TOD tests are typically conducted in 250-ml translucent

polyethylene bottles with lined screw caps. Groundwater from the site or deionized water is added to field soils (about 125 ml). Controls are prepared in similar containers with deionized water. Oxidant is added, the bottles are sealed and shaken vigorously for about 15 seconds, then allowed to stand at room temperature for a period of 48 to 72 hours. Samples can be acquired from the bottles and measured throughout this time period if it is desirable to characterize the kinetics of oxidant depletion. If the oxidant is permanganate, no color indicator is necessary because of the strong purple color from permanganate (measured spectrophotometrically at 525 nm [APHA, 1998]). If the oxidant is persulfate or others, a starch-iodide or other red-ox indicator is necessary. The varying ratios of oxidant/soil mixtures are allowed to react, and the resulting color is measured. The TOD can be narrowed down to the mixture ratio where color remains and the mixture ratio where color is depleted. Based on numerous TOD tests, the TOD can be as little as 0.05 grams of oxidant per kilogram of saturated soil (for carbonate aquifers, for example) or as high as 15 grams of oxidant per kilogram of saturated soil (for organic-rich sediments under sulfate-reducing conditions, for example).

Another variation of the colorimetric technique utilizes a single aquifer or soil sample and excess oxidant (and color indicator, if necessary).

Siegrist et al. (2001) present a summary of oxidant demand test results, with the oxidant permanganate, from various experimental and field studies. The results of the 10 to 15 studies they presented suggest the permanganate demand by natural media varies from 2 to over 100 mg MnO_4^- per mg of organic carbon measured in the natural media. It is important to note that this demand is comparable to that of targeted contaminants such as trichloroethylene (TCE) and tetrachloroethylene (PCE).

Another variation of the colorimetric technique utilizes a single aquifer or soil sample and excess oxidant (and color indicator, if necessary). The oxidant is allowed to react and the excess oxidant is "titrated" back with a reductant, such as sodium bisulfite or sodium thiosulfate. This colorimetric technique has the advantage that it only requires one sample, but it does require the additional titration step at the end of the reaction time.

The permanganate colorimetric technique uses a selected maximum ratio of oxidant mass to soil mass (10 g/kg), using soil samples that have been collected from different soil borings or different depths within the same boring. The oxidant/soil mixtures are mixed and allowed to react for a select period—typically 48 hours. Following the reaction period, the TOD is determined by titrating the mixture with a solution of a reducing compound (sodium thiosulfate) until the purple color of the permanganate ion disappears:

$$8KMnO_4 + 3Na_2S_2O_3 + H_2O \rightarrow 3K_2SO_4 + 3Na_2SO_4 + 8MnO_2 \rightarrow + 2KOH$$

The governing reaction shows that 3 moles of sodium thiosulfate are required to reduce 8 moles of potassium permanganate. When multiplied by the appropriate molecular weights, a required mass ratio of 0.375 grams of sodium thiosulfate to potassium permanganate is required. The mass of excess oxidant is calculated in one of two ways. A known (standardized) solution of thiosulfate can be used and the excess oxidant calculated from the required volume of titrating solution, its molar concentration, and the required (stoichiometric) mass ratio. Alternatively, a control solution of permanganate (containing about the same mass as was added to the soil water mixture) can be titrated with an unstandardized thiosulfate solution. This titration (essentially a standardization step) gives the volume of solution required per unit mass of permanganate added. The same thiosulfate solution is also used to titrate the soil water mixtures. The mass of excess oxidant is then the volume required for titrating a given sample divided by the volume-to-mass ratio required for the control. The TOD is then the difference between

the mass of original oxidant and excess oxidant divided by the mass of soil. Titrations are typically prepared using about 0.1 to 0.2 M sodium thiosulfate solutions. These reductant concentrations are used to ensure that there is adequate sensitivity in the titration volume to measure TOD differences on the order of or less than 0.1 g/kg.

Depending on the soil characteristics—most notably, the soil color—titrations can require slow, step-wise additions of reductant followed by a short settling period to observe the color in the water phase. In addition, some cohesive soil can absorb permanganate and release it slowly; therefore, the stepwise procedure with vigorous mixing may also be required under these conditions.

Another method that can be employed is direct measurement (i.e., no titration) of permanganate concentration (initial and at selected time points). No indicator is necessary as the deep purple color of the permanganate ion is used. Direct spectrophotometric measurements are made of the samples, and translated to concentration using a standard calibration curve (APHA, 1998). The demand then equals the difference between the initial and final permanganate concentrations for the mass of sample examined. It is important to note that when applying this method, MnO_2 by-product and other solids must be pre-filtered (0.2 μm) from the aqueous phase sample as they interfere with permanganate absorption measurements at 525 nm, and the concentration of the resulting permanganate solution must fall within the calibration range (i.e., samples may require dilution).

In the absence of a test, TOD can be estimated by examining the current biogeochemical state of the aquifer.

Inferring TOD from Other Data

In the absence of a test, TOD can be estimated by examining the current biogeochemical state of the aquifer. For example, if the geochemical state of the subsurface system is highly reducing (or biologically anaerobic), it will require injecting significant quantities of chemical oxidant in order to bring the aquifer sufficiently oxic for oxidation of the target contaminants. As a second example, if there is elevated dissolved oxygen (DO), then ISCO may be applicable because there may not be significant quantities of reduced metals.

Fortunately, the analytical measurements of the groundwater that indicate the biogeochemical state of the aquifer are often collected as part of an overall assessment program. These results can be used in the absence of a TOD test to infer the magnitude of the oxidant sinks. These parameters include: pH, ORP, dissolved oxygen, alkalinity, dissolved iron and manganese, sulfate, nitrate (or ammonium), and dissolved hydrocarbons such as methane, ethene, and ethane. Ethene and ethane are important when the target contaminant is chlorinated alkenes, such as TCE plus daughters. ORP measurements must be interpreted in conjunction with the other parameters. In a number of instances, conflicting ORP measurements have been observed (e.g., a large negative ORP reading for a system that has elevated dissolved oxygen).

In general, the biogeochemical state of the aquifer changes from background conditions in response to microbiological activity associated with the released contaminants and other materials. Typically, for sites with some petroleum contaminant released, oxygen is the first element that is consumed during microbial processes. Microbes gain energy from the consumption (oxidation) of electron donors coupled with the utilization (reduction) of electron acceptors. For example, a common biodegradation activity is the aerobic metabolism of fuel contaminants. In this case, oxygen is the electron acceptor, while the fuel hydrocarbon is the electron donor, which may be oxidized completely to CO_2 by this process. After the oxygen is consumed, alternative electron acceptors, such as nitrate and sulfate, may be utilized in contaminant oxidation in the

absence of oxygen. In general, the electron acceptor will be used in the following order: $O_2 > Mn^{+4} > NO_3^- > Fe^{+3} > SO_4^{2-} > CO_2$. Thus, the presence or absence of these parameters will indicate the ORP range of the groundwater. For example, if nitrate was depleted and sulfate was present at high levels, it may be concluded that the system is moderately reducing (somewhere around iron-reducing conditions). If sulfate was not present at elevated levels and methane was present, the system would be even more reducing, past sulfate-reducing conditions and onto methanogenic conditions. Methanogenic is generally the most reducing that an aquifer can naturally sustain.

As previously stated, the presence or absence of these parameters in comparison to background levels can be used to infer the geochemical state of the subsurface environment. Absence of DO (less than 2–3 ppm) indicates anaerobic or anoxic conditions. The presence of dissolved manganese (greater than 10 ppm) may indicate manganese-reducing conditions. As the manganese (+4) accepts electrons, it is converted to the generally more soluble manganese (+2). Nitrate depletion may indicate denitrification (the reduction of nitrate to N_2) or nitrate reduction. Nitrite, an intermediate in denitrification, may also be an indicator of this process. Elevated ammonia/ammonium measurements can also indicate nitrogen-reducing conditions. The presence of dissolved iron (greater than 10 ppm or so) may indicate iron-reducing conditions where generally insoluble ferric iron has been reduced to more soluble ferrous iron. However, under sulfate-reducing conditions, hydrogen sulfide is produced that readily precipitates ferrous iron. Sulfate depletion (relative to background) or the presence of sulfide gas may indicate sulfate-reducing activity. The presence of dissolved methane gas (10 to 100 ppb or so) in groundwater indicates methanogenic conditions. Elevated concentrations of these gases will also indicate microbial activity in groundwater samples. Chapelle et al. (2002) have recently shown that sulfate may be present at 10s of ppm and methanogenic conditions may still be present.

Based on hundreds of TOD tests and comparing those data to standard geochemical parameters, we have noted some trends for TOD. These estimates should only be used in the absence of a TOD test and should be considered order-of-magnitude estimates at best. There are wide ranges that can be expected for TOD. In general, the lesser the amount of minerals (iron or manganese compounds, for example) or NOM in the soil, the lower the TOD. However, even moderate amounts of minerals and/or NOM under highly reducing conditions can result in TOD values that may preclude ISCO as a viable remedial alternative. At the same time, moderately strong reducing conditions have been observed along with a low TOD for limestone aquifers. Exhibit 1 summarizes the various inferences on TOD.

Geochemical Condition	Occurrence	Range of TOD
Low metals content	Limestone or clean sand	<0.1 to 0.5 g/kg
Low NOM	Limestone or clean sand	<0.1 to 0.5 g/kg
Oxic conditions	Elevated dissolved oxygen	<0.1 to 1 g/kg
Mildly reducing conditions	Elevated ferrous iron	<0.1 to 2 g/kg
Moderately reducing conditions	Depressed nitrate but elevated sulfate	<0.1 to 5 g/kg
Strongly reducing conditions	Elevated methane or ethene (for chlorinated volatile organic compounds)	<0.1 to 15 g/kg

Exhibit 1. Inferences on TOD

CONSIDERATIONS FOR TOD

There are many factors to consider when completing a TOD test. It is desirable but not always practical to complete the test in the field under ORP conditions that mimic the current aquifer conditions. The test should be completed in the target treatment area, but the level of contamination may affect the ORP conditions. As a result, the test results may need to be corrected for large variations in contaminant concentration. The TOD test should be viewed as an analytical and quantitative estimate of the oxidant required to overcome reduced minerals and NOM. It is not an exact measurement, but it is significantly better than an estimate based on semi-qualitative or even indirect quantitative measurements (e.g., total organic carbon). Estimates of TOD are crucial to a successful ISCO remedial approach because the oxidant demand for reduced minerals and NOM can be significantly greater than the oxidant demand for target contaminants.

The TOD test should be viewed as an analytical and quantitative estimate of the oxidant required to overcome reduced minerals and NOM.

SAMPLE SIZE

The sample size can obviously affect the TOD test results. Given the variability in subsurface geochemistry, a consistent sample size and several TOD tests for the site are recommended. For numerous TOD tests, a 100g sample has proved to be sufficient. With this sample size, we add about 1g of potassium permanganate, which is almost always sufficient. In the cases where it is not sufficient, it would generally indicate that chemical oxidation may not be a cost-effective remedial alternative for the site. The TOD tests are typically conducted in 500-ml translucent polyethylene bottles with lined screw caps.

SAMPLE LOCATION AND NUMBER

The location of the soil sample requires some thought. When confronted with a soil sample in a clear liner, there are often large visible variations in the soil composition. There may be areas with clear indications of iron-staining, while other areas may have visibly greater levels of NOM. When there are large natural variations, it is recommended to take a greater number of soil samples from the core rather than try to produce a more homogeneous sample by mixing soil samples from different portions of the core. The mixing process (especially in open air) could result in mineral oxidation and inadvertently bias TOD toward a lower result.

Obviously, there can be large variations in the ORP over the aquifer. This can translate to large variations in TOD. For example, chlorinated solvents often were used as degreasing agents prior to disposal. At the point of disposal, the grease may result in biological activity that produces highly reducing conditions. Because the grease may not be as mobile with the groundwater (as compared to the chlorinated solvent), the subsurface environment may become less reducing farther away from the original disposal point. Therefore, it is desirable to complete TOD tests over the entire portion of the aquifer so that the range in TOD is captured. This is, of course, if ISCO is being considered for the entire plume. Sometimes, ISCO is used for the source area, and other less aggressive approaches are used for the remaining portion of the aquifer.

There are many factors that will determine the sample location. These may include the current characterization of the plume, access to sampling locations, etc. In all cases, the sample for the TOD must be collected within the plume and preferably within the area where ISCO will be applied. The contaminants targeted for treatment (or their co-

contaminants) will almost always affect the ORP state of the subsurface environment. The only exception is if the sample absolutely cannot be collected from the treatment area (for let's say, high radioactivity or some other reason). In this case, it may be worthwhile to consider an injection pilot test rather than a TOD test, if there are not other implementable and viable options.

SAMPLE PRESERVATION

In a perfect situation, the TOD test would be initiated in the field so that the ORP conditions of the test are maintained. However, from a practical point of view, this is not always cost-effective or viable. Also, given that the ORP varies dramatically over the site, there is a question of how to maintain the sample. A nitrogen glove box may make the conditions more anoxic than they were in the field, while working in open-air may be too oxic. It is impossible to know and mimic the entire range of ORP conditions that are encountered in the field. The most effective approach is to minimize the exposure of the sample to another environmental condition.

Typically, the soil sample is collected in an acetate liner using direct push technology. The liner is sealed on both ends as quickly as possible with plastic caps. The soil sample is stored on ice until it is prepared for analysis. Analysis should be initiated as soon as possible—preferably within 24 hours.

If the TOD test is being completed in the saturated zone, it is preferable to collect a groundwater sample at the same location of the soil sample. However, it is not entirely necessary, in our opinion, to use a groundwater sample in the TOD test. After having completed numerous oxidant tests on groundwater alone, the oxidant demand from the water phase is often negligible (less than 1 percent) compared to the soil phase. So if the aquifer will not yield sufficient water for the TOD test, distilled water can be used without compromising the estimate of the test. If groundwater is collected, transfer the groundwater to a 250- to 500-ml amber jar with zero headspace. Store the sample on ice as quickly as possible. Do not use any preservatives for the groundwater because it will alter the natural geochemical conditions and the TOD test results.

If the TOD test is being completed in the saturated zone, it is preferable to collect a groundwater sample at the same location of the soil sample.

PRESENCE OF DNAPL

The presence of DNAPL may result in very high TOD levels. However, visible free phase product is seldom encountered. In highly contaminated areas, it may be necessary to correct the TOD for the contaminant concentrations in order to get a true picture of the background oxidant demand. This may only be warranted for sites where a few number of samples have been collected and analyzed for TOD. In this case, the soil and groundwater should be analyzed for the target contaminants. Thereafter, the reaction stoichiometry should be determined, and the load of oxidant for the contaminant only should be calculated. In this manner, the oxidant demand can be extrapolated over a large portion of the site without it being completely biased toward the portion of the oxidant demand that is from the target contaminant.

As an example, consider a hypothetical TOD test completed with potassium permanganate on a saturated soil sample with high levels of trichloroethene. For illustrative purposes, assume the contaminant concentration in the soil was 110 milligrams per kilogram (mg/kg), and the groundwater concentration was 150 milligrams per liter (mg/l). The TOD test results were 3.2 grams per kilogram (g/kg) of saturated soil. Assume the

treated area is 10 m × 10 m × 10 m, the effective porosity is 30 percent, and the soil density is 1.7 grams per ml. The permanganate required for just the soil contaminant is 0.297 g/kg of dry soil, the permanganate required for the aqueous phase contaminant is 0.406 grams per liter of groundwater. For the hypothetical aquifer, this translates to 122 kg of permanganate for the aqueous phase contamination, 505 kg of permanganate for the soil phase contamination, and 6,400 kg of permanganate to overcome TOD. In this example, the contamination is biasing TOD to be greater than the background oxidant demand. Interestingly though, even with very high levels of contamination, the mass of permanganate required to overcome TOD is significantly more than the contaminant oxidant demand.

CONTAMINANT LOCATION

Proper implementation of ISCO in the vadose zone will require saturating or nearly saturating the soil.

The TOD test for the vadose zone differs slightly from saturated conditions. For the vadose zone, the test uses distilled water to saturate the soil sample. For saturated conditions, groundwater should be used to saturate the soil sample. However, as previously discussed, distilled water can be substituted for groundwater if sufficient groundwater is not available for the saturated zone test. Proper implementation of ISCO in the vadose zone will require saturating or nearly saturating the soil. The water for mixing the oxidant will likely come from the nearest potable water source. If the water source is known for the potential implementation, that water can be used to saturate the soil sample for the TOD. However, oxidant demand on potable water is typically negligible, so it may not be necessary to use the potable water source.

Fractured Bedrock

The value of a TOD test in fractured bedrock environments is questionable. It is extremely difficult to determine the surface area of rock that will be exposed to the oxidant during an injection into fractured rock. If the sample is pulverized in the laboratory prior to the TOD test, this substantially increases the available surface area available for reaction. The surface area will be much greater than that contacted in the actual ISCO field implementation and, as a result, the TOD test results will lead to overinjection. There also can be geochemical alterations (change in oxidation state) when the sample is pulverized if extreme care is not taken to make sure the atmospheric environment does not alter the minerals. If the sample is not pulverized, the ambient pressures typically associated with a TOD test may not be sufficient to mimic the reaction area that will occur in the field. In this instance, TOD would be underestimated. More expensive flow-through cell measurements could be made for fractured bedrock, but it is feasible to forego a TOD analysis. A small-scale injection test may be more suitable for fractured bedrock environments.

OXIDANT CONCENTRATION

Permanganate Decomposition

It has been demonstrated in several instances that the initial concentration of permanganate applied in a TOD test will influence the ultimate TOD measured for a sample. A higher initial permanganate concentration will result in a higher oxidant demand

(Siegrist et al., 2001; Siegrist et al., 2002). It is possible this effect is due to autocatalyzed decomposition of permanganate by the by-product MnO_2.

$$4MnO_4^- (aq) + 2H_2O \rightarrow 3O_2 (g) + 4\ MnO_2(s) + 4OH^- \quad [1]$$

Due to this potential for additional permanganate consumption, TOD testing should be conducted at several permanganate concentrations at the site. It is not advisable to extrapolate results of tests conducted at one oxidant concentration to another, especially to a higher range. In lieu of conducting the tests at multiple concentrations, the test should be completed at concentrations that are expected for the actual implementation. Often, the goal in the implementation of the ISCO is to get as much permanganate in per pound of fluid injected. This may necessitate working at near permanganate solubility limits for the TOD testing.

Sodium Persulfate TOD

The TOD test for persulfate is very similar to the titration test for TOD for permanganate. The main exception is that sodium persulfate solutions do not have visible color under normal reaction conditions. As a result, a starch-iodide indicator is used to visually determine the ORP change. The colorimetric technique uses a selected maximum ratio of oxidant mass to soil mass (10 g/kg) that has been collected from different soil borings or different depths within the same boring. The oxidant/soil mixtures are mixed and allowed to react for a period of 48 hours. TOD is determined by first adding potassium iodide to produce iodine from unreacted persulfate:

In lieu of conducting the tests at multiple concentrations, the test should be completed at concentrations that are expected for the actual implementation.

$$S_2O_8^{2-} + 2\ I^- \rightarrow 2SO_4^{2-} + I_2$$

The potassium iodide is typically added in excess (approximately 10 times the molar concentration of the original persulfate added). Excess iodide is used because the reaction kinetics are relatively slow and the solution is allowed to react for 1/2 to 1 hour. The orange-red colored iodine solution is then back-titrated with a solution of a reducing compound, sodium thiosulfate:

$$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$$

Starch indicator is added near the end of the titration (when the solution becomes pale yellow) to produce an intensely blue-colored starch-iodine complex. The indicator is not added until this point because the complex formation can yield irreversible products when iodine concentrations are high. The titration is then continued until the blue complex color has dissipated. The governing reactions show that two moles of sodium thiosulfate are required to reduce one mole of iodine, which, in turn, was produced from one mole of excess persulfate. When multiplied by the appropriate molecular weights, a required mass ratio of 1.33 grams of sodium thiosulfate to sodium persulfate is required. The mass of excess oxidant is calculated in one of two ways. A known (standardized) solution of thiosulfate can be used and the excess oxidant calculated from the required volume of titrating solution, its molar concentration, and the required (stoichiometric) mass ratio. Alternatively, a control solution of persulfate (containing about the same mass as was added to the soil water mixture) can be titrated with an unstandardized thiosulfate

solution. This titration (essentially a standardization step) gives the volume of solution required per unit mass of persulfate added. The same thiosulfate solution is also used for titrating the soil water mixtures. The mass of excess oxidant is then the volume required for titrating a given sample divided by the volume-to-mass ratio required for the control. TOD is then the difference between the mass of original oxidant and excess oxidant divided by the mass of soil.

Hydrogen Peroxide and/or Fenton's Chemistry

A TOD test can be completed in a similar manner to sodium persulfate for ISCO that is planned with hydrogen peroxide and/or Fenton's chemistry. There are some additional considerations with these oxidants because hydrogen peroxide will undergo autocatalytic decomposition. That is, the hydrogen peroxide will decompose as follows:

$$2H_2O_2 \rightarrow 2H_2O + O_2$$

If the oxygen is not utilized to oxidize the minerals, it can result in a higher than actual TOD. The autodecomposition of peroxide is accelerated by heat. So, depending upon how ISCO is implemented in the field, there may be greater losses of peroxide in the field. A TOD test for peroxide or Fenton's chemistry should only be viewed as a minimum requirement for the oxidant load.

If ISCO is going to be completed with hydrogen peroxide, it may be acceptable to use the actual oxidant. However, it may be worthwhile to consider utilizing other oxidants in the TOD laboratory test so that the minimum oxidant demand can be estimated. The actual implementation will likely require additional quantities of oxidant that can best be determined through field implementation.

CONCLUSIONS

There are many considerations for implementing ISCO. Proper estimation of TOD is just one part of a successful ISCO implementation. Even if the dose is properly calculated, there are many other factors that can hinder ISCO. Thus, proper delivery of the oxidant is also a key component to successfully implement ISCO. The oxidant must also be brought in contact with the target contaminant for the reaction to occur. The methods presented here help with properly designing an ISCO program. It is just one component of an overall program.

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